FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 183. (No. 26, Vol. IV.) | JUNE 29, 1912. | [Registered at the G.P.O. as a Newspaper.] | [Weekly, Price 1d. Post Free, 1½d.

Bowness and the Belsfield Hotel, Lake Windermere, taken from the Lakes Flying Co.'s 50-h.p. Gnome-engined "Waterhen."

EDITORIAL COMMENT.

More *Daily Mail* Activity.

With steady insistence the *Daily Mail* continues its campaign on behalf of aviation. Not content with having given money prizes which represent quite a considerable fortune for the furtherance of the movement; with having opened its columns most generously to news and comment which can help to bring home to the lay public the immense importance of flight in its many bearings; and with having already spent money with a lavish hand to demonstrate the actualities of aviation to the man in the street, still more money is to be devoted to bringing home the possibilities of the newest form of dynamic flying machine—the hydro-aeroplane. In the words of its own announcement, the *Daily Mail* will, at the end of next month, begin a series of demonstrations with hydro-aeroplanes. The object of the demonstration is to afford the public opportunities of seeing the newest and perhaps most appreciated branch of flight, and to bring home to the country the vital importance of the waterplane to the Fleet. Mr. Frank Hucks will commence flights immediately, on Farman machines, with Southampton as a base for the moment. Mr. Claude Grahame-White will also take two machines to a number of places on the south coast, so that the thousands of visitors there at the end of July and throughout August may have, with no more trouble than that of looking out to sea, in the words of our contemporary, the opportunity of watching these graceful "amphibians" wheeling in the air to seaward and alighting gently on the surface of the water For those who are not content with watching, and wish for more practical experience of the art, there will be passenger flights at a fixed charge.

The machines which will be first used by Mr. Grahame-White are a Curtiss, two Farmans, and a Caudron; Mr. Grahame-White will have a yacht to carry his spare parts and equipment from place to place along the coast; and at each town the waterplanes visit a special shed and an enclosure will be erected for the machines. It will be seen, therefore, that the demonstration is going to cost our contemporary a great deal of money. Doubtless, there will be some—it is very much the fashion to sneer at the methods of the "halfpenny press"—who will point out that where the *Daily Mail* will recoup itself is by the value of the advertisement it will receive. But we will pay our contemporary the compliment of saying there is no need for it to seek advertisement of this expensive kind—it has long got past the stage when anything of the sort might have been essential to its prosperity. On the contrary, we believe that the enterprise has been undertaken from motives of real public spirit, and under a sense of moral responsibility to the nation.

That we agree in the necessity which exists for the grave fact to be brought home to the public, that we are face to face with new problems of defence which may have a decisive bearing on the future of the Empire we need not insist. That we hold to that opinion must be sufficiently obvious to the reader of FLIGHT who has followed what we have from time to time written on the subject. Therefore, we need not now go out of the way to emphasise those opinions. All that we need do at the moment, is to congratulate our contemporary upon this still further proof of its surpassing interest in flight, and to tender to it our own thanks—and we believe we may also speak for the whole movement—for its public spirit.

The Rule of the Air.

The regrettable accident which resulted in the deaths of Capt. Dubois and Lieut. Peignan at Douai last week, points the moral that it is absolutely necessary that there should be formulated without delay an international code of rules of the air, similar to that in use at sea. We are not unaware of the fact that something of the sort has already been attempted, both by the Aero Club of France, the F.A.I., and other bodies, the only really effective result being found in the lengthy decree issued by the French Public Minister of Works in November last year, and of which a *résumé* appeared in FLIGHT of December 2nd, 1911.

Although possibly not ideal in all respects, these might well form a very fine basis upon which to formulate a thoroughly sound set of rules of the air, but the regulations under this decree scarcely go far enough. They apply more to the registration and licensing of machines, though certain provisions relative to the manner in which aircraft are to be flown are introduced. For example, the lights to be carried are fixed by law. Dirigibles are to carry three lights, white, red and green as used by steam vessels at sea, while aeroplanes are to carry similar lights, although the regulation in their case is not to be insisted upon at first.

So far as regards passing, the regulations provide that dirigibles and aeroplanes shall give way to free balloons, but there is nothing to govern the conduct of these two classes of craft when meeting or passing each other. Moreover, even so far as these regulations take us, they only apply to aircraft in use over French territory, while it is with the general and International aspect of the question with which we are most concerned at the moment.

The accident which supplies the case in point seems to have occurred in fog or thick haze, so that it is quite possible that the most complete code and its strictest observance would not have operated to avoid it. It was one of those occurrences which are described as "the act of God." But even supposing this to have been the case, the point we have made still remains. Not so long ago an aeroplane in flight was a species of curiosity, and the risk of accident through collision was practically negligable, but now the case is altered, and aeroplanes are at least common enough for the danger to be an appreciable one. Therefore, the question of codifying an international rule of the air has become, if not exactly a pressing one, still one that must receive early consideration.

As to what shape this rule of the air should take, we can suggest nothing better than that the rule of the road at sea should be lifted and adapted to the purpose. For instance, two steam-vessels meeting end on are each required to alter their course to starboard, thus passing port side to port side. Two steamships crossing, the one which has the other on its own starboard side gives way. In the case of vessels overtaken the overtaking one gives way to the overtaken, while a steamer always gives way to a sailing vessel. It would be perfectly easy to apply almost the whole code to aircraft as it stands, the dirigible being regarded as the sailing craft of the air and the code, with necessary modifications in detail, such as specific distances for passing, &c., made to fit in with almost every conceivable situation that could arise.

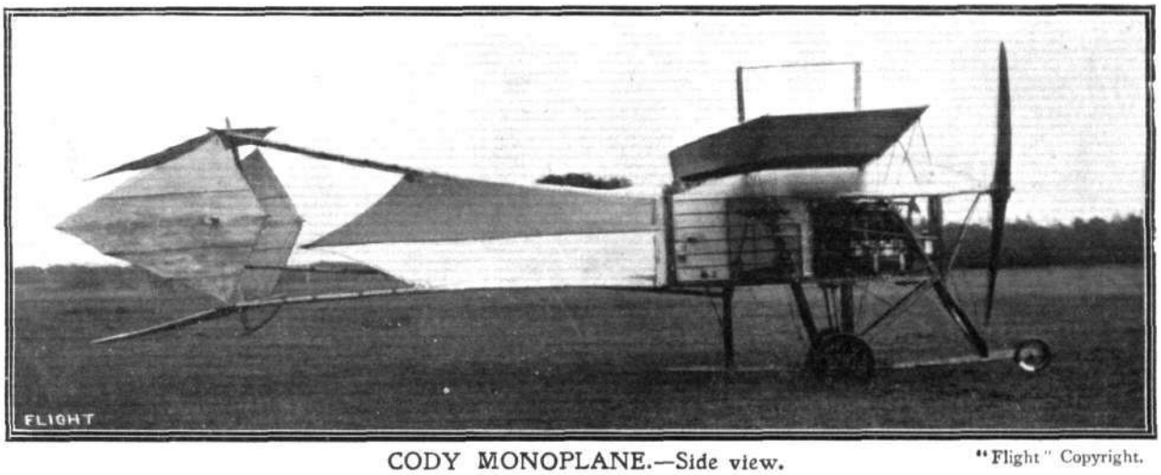
FLIGHT

THE CODY MONOPLANE.

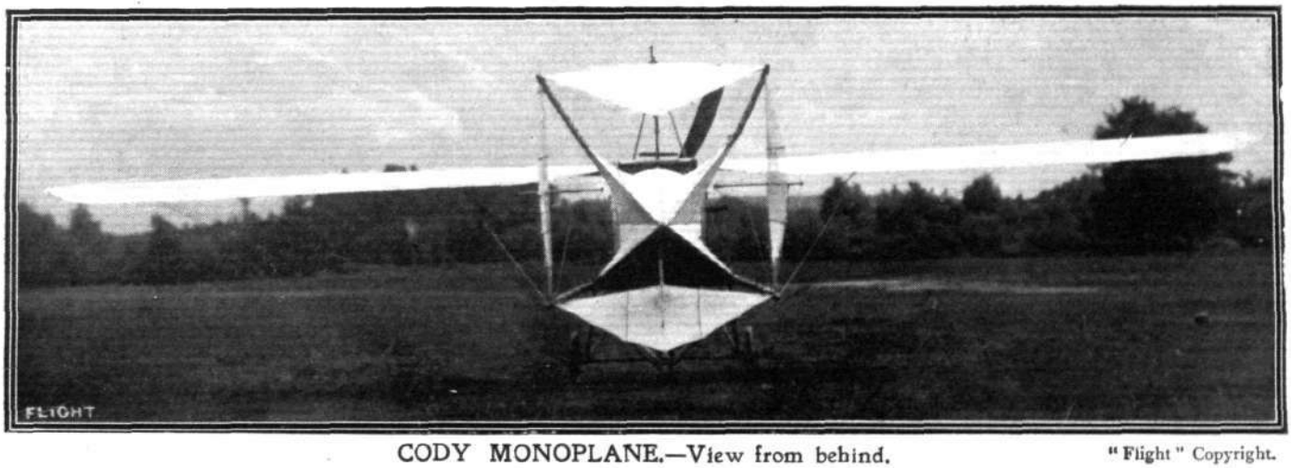
IT will come as no surprise to our readers that that skilful designer and intrepid pilot Mr. S. F. Cody, has built a monoplane, as his work in this direction was announced recently in these pages. Now that the new machine has been tested in "occasional jumps," in the words of Mr. Cody himself, there is no need any longer to withhold information concerning it from the public ken, and so by the aid of the accompanying photographs and brief description, we proceed to place before readers of FLIGHT the main essentials of this very interesting piece of work.

A description of the new machine is easier said than done, for there is none other like it to which it may readily be compared. Mr. Cody has always been original, and he remains original even in this, the most stereotyped, perhaps, of all types of flying machines. And this designer's originality is the originality of the inventor rather than of the mere improver. It is a fact that he had never even seen an aeroplane before he had built and flown the first great biplane that was associated with his name. For all the evidence that exists in the new flyer now under consideration, he might never have seen a monoplane either. In so far as the new machine gives evidence of influence in its design, the influence is that of his experience with biplane construction; the wings are similar to the biplane type, so, too, is the undercarriage—of course. The body is

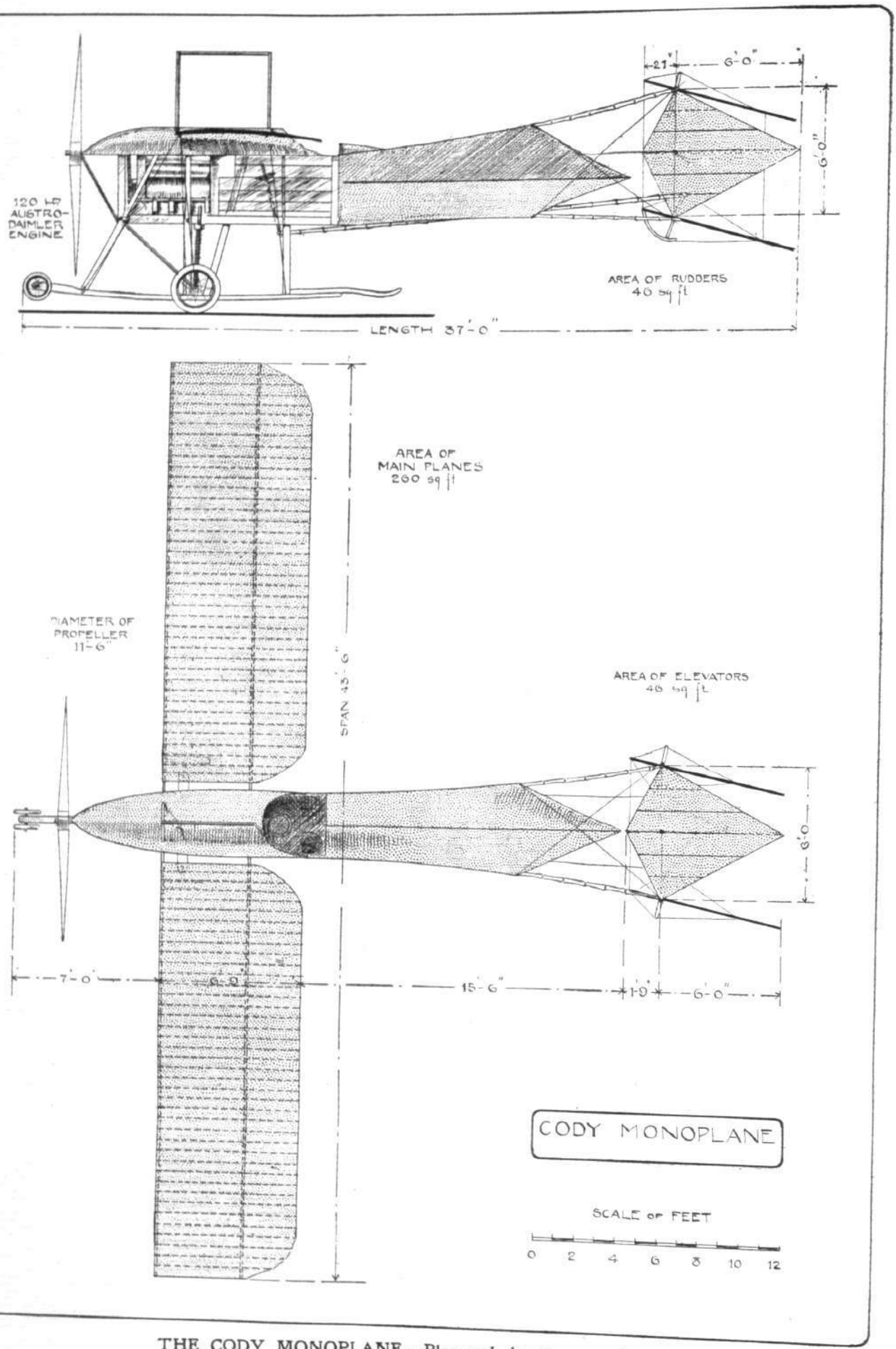
CODY MONOPLANE.—View from in front. "Flight" Copyright.



CODY MONOPLANE.—Side view. "Flight" Copyright.

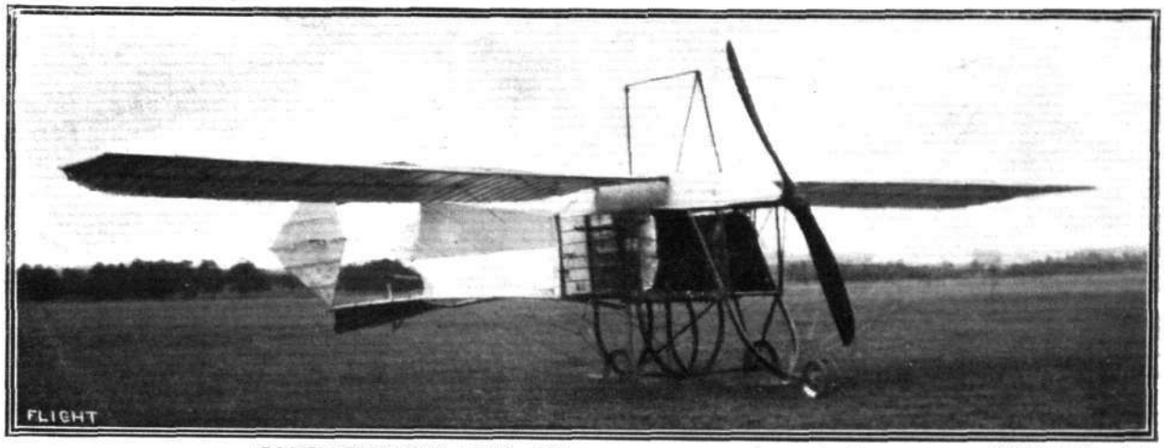


CODY MONOPLANE.—View from behind. "Flight" Copyright.

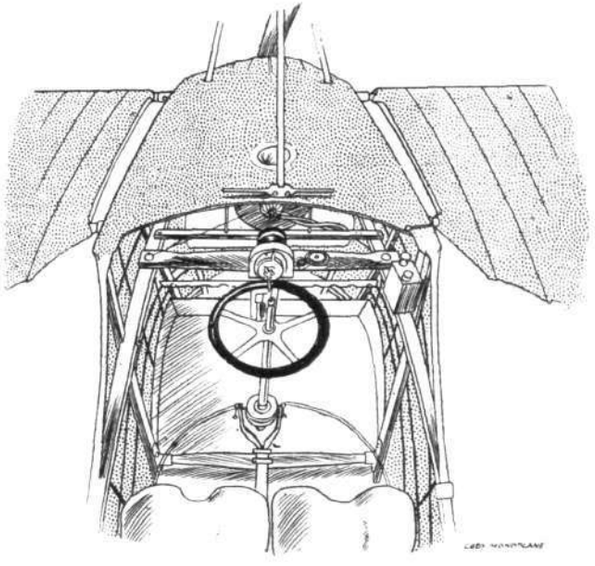


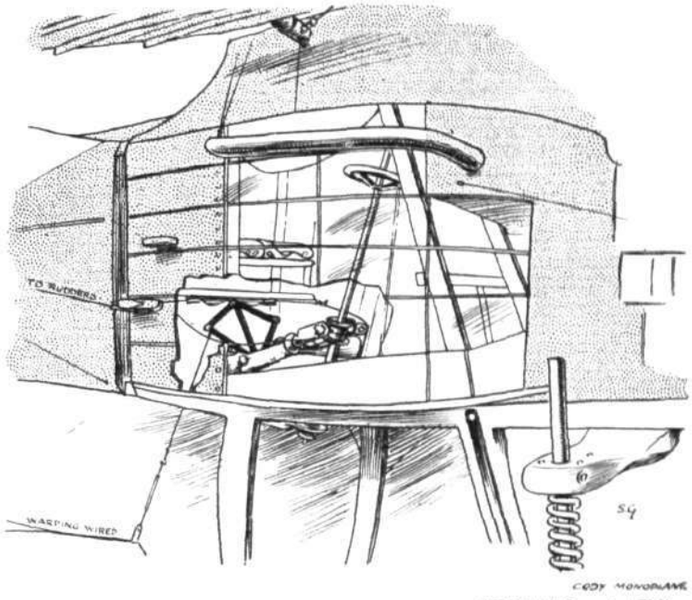
THE CODY MONOPLANE.—Plan and elevation to scale.

altogether new and consists of two distinct sections, the forward part accommodating the engine and pilot, while the after portion consists of bamboo booms with surfacing material stretched between them to form dihedral planes, thus making this after portion look very much like the tail of a paper dart. At its extremities are the tail members proper.



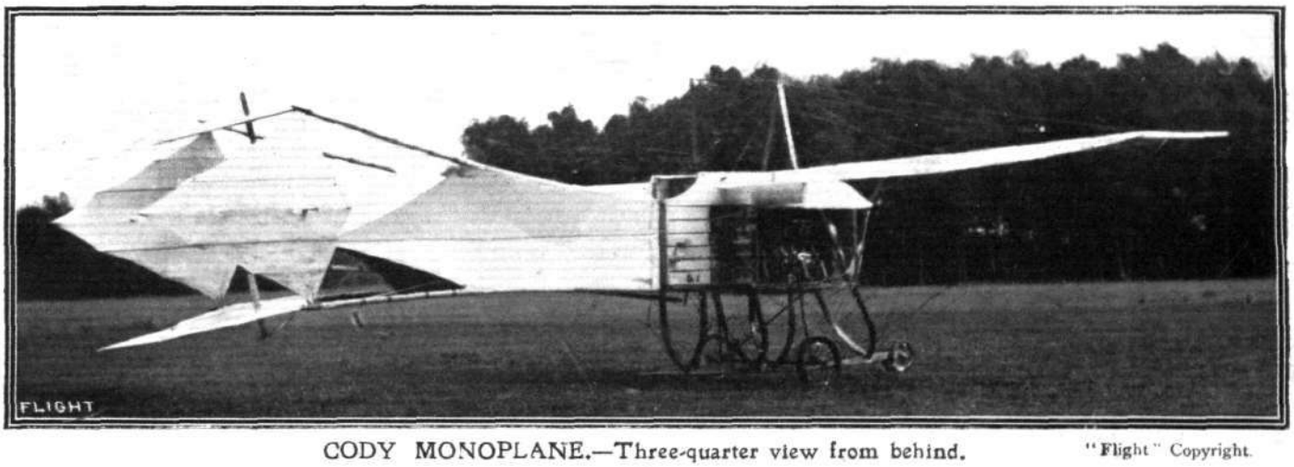
CODY MONOPLANE.—Three-quarter view from the front. "Flight" Copyright.





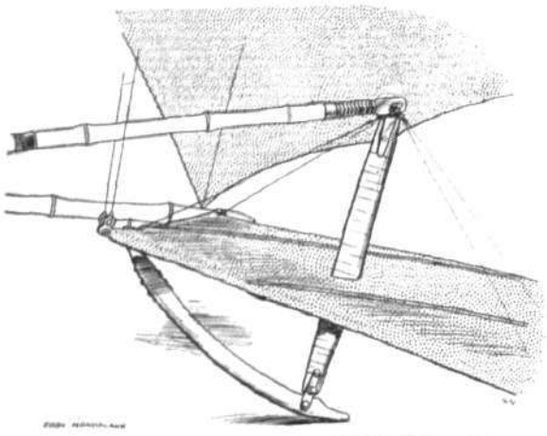
"Flight" Copyright.

Sketch of the inside of the cockpit of the Cody monoplane, showing the two seats and the centrally-disposed control column. It also gives a good idea of the extent of view that is obtainable from the machine, not only through the transparent covering of the cabin, but over the side of the body. On the right is a sketch from the outside of the cockpit. The covering is suggested as being cut away in order to make clear details of the warping control.



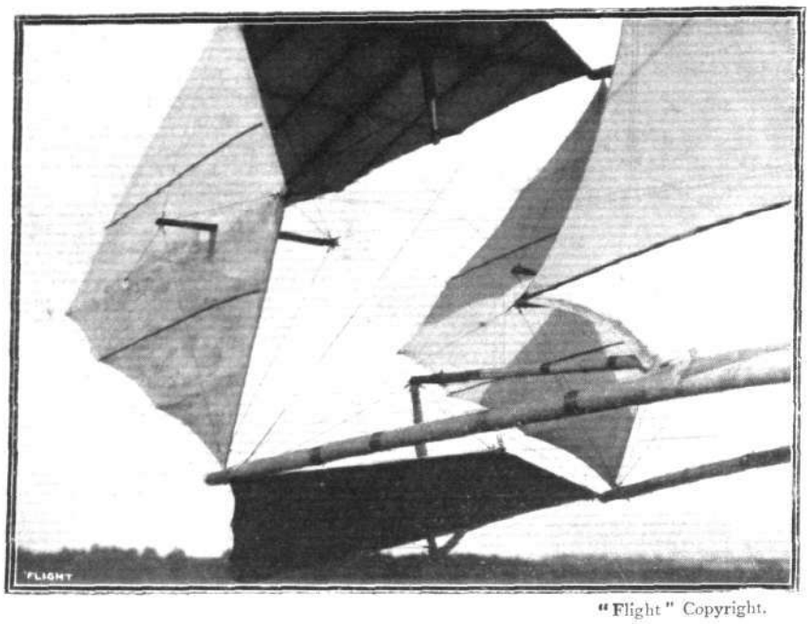
CODY MONOPLANE.—Three-quarter view from behind. "Flight" Copyright.

Certain characteristic features worthy of special note include the relative positions of the engine, pilot and wings, the engine is low and the wings are high, the pilot sits behind the engine and has



"Flight" Copyright.

Showing how the rear elevators are operated by the long bamboo connecting-rods, and how the rear skid is attached.



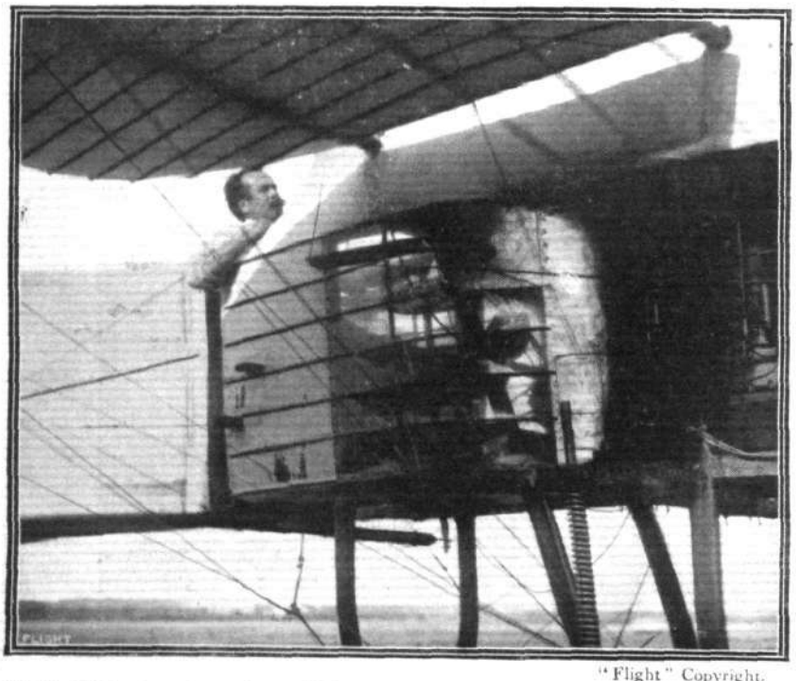
"Flight" Copyright.

Enlarged view of the tail members of the Cody monoplane.

an outlook under the trailing edges of the wings. Coupled with the strong and massive undercarriage there is sufficient evidence of a low centre of gravity. The propeller shaft on the other hand is placed higher up and is driven by a vertical chain.

The machine has an overall length of 37 ft., a span of 46 ft. 6 in. and an overall height of 12 ft. 6 in. that can be reduced to 8 ft. 6 in. in a few minutes for transport by folding down the *cabane*. Similarly, by dismantling the tail the overall length is reduced to 31 ft. These transport facilities have been influenced by the War Office Competition rules, in which event we hope to see the Cody monoplane figure prominently. The engine is a 120-h.p. Austro-Daimler motor and the transmission chain a Brampton. The propeller is a British-built Chauviere, 11 ft. 6 in. in diameter and pitch. In construction, it has 10 laminations of walnut.

It runs at two-thirds engine speed, for there are 24 sprockets on the crankshaft wheel and 16 on the propeller wheel. The static thrust from this combination Mr. Cody estimates to be something in the neighbourhood of 800 lbs. Aft of the engine is the cockpit for the accommodation of the pilot and passenger. They are seated side by side and the control is arranged in the central position so that both may be able to handle it with equal facility. As regards this, the Cody control is especially convenient for all three controlling movements of the rudder, the elevator, and the warping are operated from the one column. A movement of the column to and from the operator actuates the twin elevators by means of a long bamboo connecting rod. Warping is done by swinging the column from side to side. To steer, the handwheel is rotated. The type of seat that Cody provides for the pilot and passenger are fully recognised as Cody seats. Otherwise, the same style of thing is used very frequently on agricultural machinery. Nevertheless, for comfort they leave nothing to be desired.



"Flight" Copyright.

S. F. Cody in the cabin of his new monoplane, showing the control-levers through the windows.

"Flight" Copyright.

S. F. Cody gives a slight test of the strength of the top bracing of his monoplane by hanging his 200 lbs. weight on to the extreme tip of one of the wings.

Those aboard the machine are protected from the rush of air by a bulkhead that separates the motor from the cockpit. The magnetos—there are two—however, protrude through this bulkhead, as also does the rear end of the crank-shaft. To this a chain-wheel is keyed for it was intended to fit a starting handle so that the engine could be set in motion by the pilot without any need of him having to leave his seat. But Bosch dual ignition, Mr. Cody finds, answers its purpose quite well, so the extra weight of a cranking device has been saved.

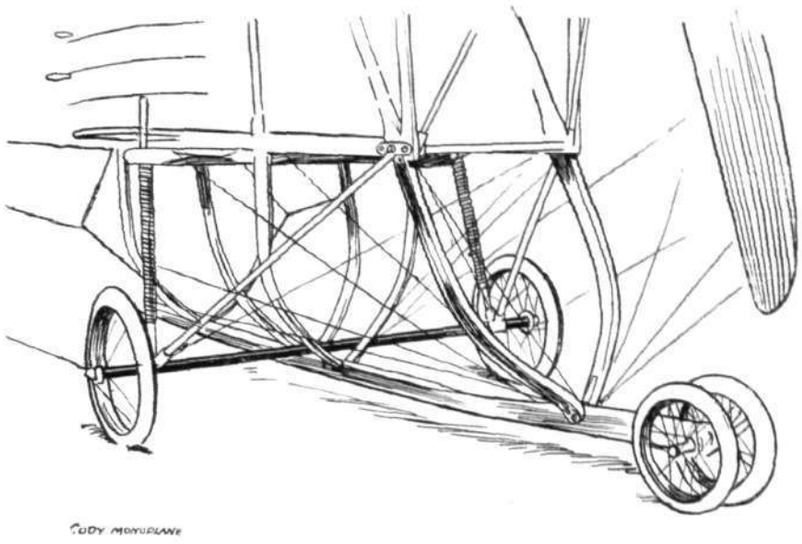
On either side of the cockpit transparent windows of non-inflammable celluloid give the pilot a clear view of what is going on beneath him.

A type of bonnet extends back from the propeller to a point just in front of the pilot. Under this bonnet are arranged the fuel tanks. Those at present fitted are of small capacity, just sufficient for testing purposes, but a petrol tank holding something like 68 gallons and an oil tank to correspond are being put through. These will replace the existing reservoirs when the preliminary trials are finished.

Below these is the silencer, also fitted inside the cockpit. It exhausts through a large diameter pipe on the right-hand side.

The landing gear will be quite familiar to those who have studied Cody's previous machines. The only innovation is that the four pairs of hickory struts supporting the body from the central skid are curved. By curving them in this fashion a great deal of springiness is introduced between the skid and the body, and should the landing wheels spring up far enough for the skid to come very forcibly into contact with the ground, there would be far less likelihood of damage resulting than if straight struts were used.

Regarding the wings, the same type of construction is employed as is used in the planes of the Cody biplane. Each is stayed from above by six 12-gauge wires and from below by twelve stays, each composed of a pair of 12-gauge wires.



"Flight" Copyright.

The landing chassis of the Cody monoplane.

Quite a feature of the machine is the ease and surety with which it may be "taxied" about. Mr. Cody gave us a demonstration of this, and turned figures of eight on the ground in surprisingly little space.

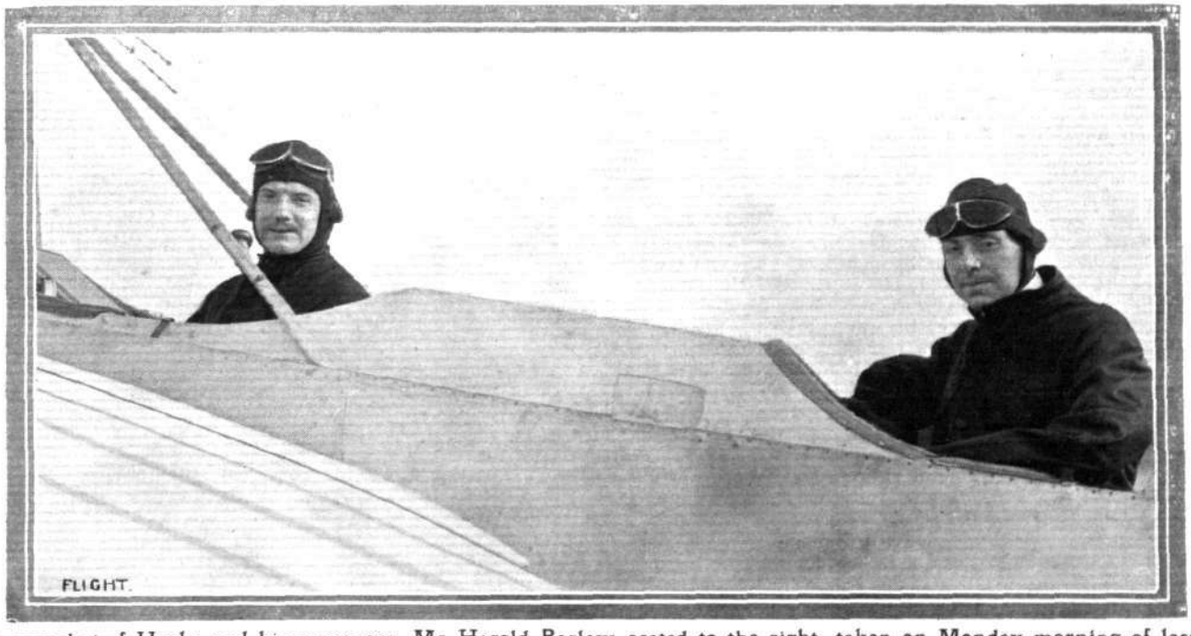
From the tests that have already taken place, the machine has shown itself to have exceptional powers at climbing. Its speed is not certainly known at present, but somewhere very near and possibly more than seventy miles per hour is about the figure. The weight is 1,400 lbs. without passengers or fuel.

⊛ ⊛ ⊛ ⊛

MY FLIGHT WITH A PASSENGER FROM PARIS TO LONDON.

WE—that is Mr. Harold Barlow and myself—tried out our new machine—a 70-h.p. two-seater Blériot of the latest type—at Issy les Moulineaux early on Sunday morning of last week. There was very little wind about, but as it was foggy and drizzly it was out of the question to attempt a start for London.

On the first trip I did not take a passenger, but to compensate we strapped an equivalent load of lead to the back seat. Nothing very much happened, except that perhaps to the onlookers there may have appeared more wind than there really was. This was owing to the comparative strangeness of the controls, after having been used to a Blériot of only 50-h.p., and of much earlier type. On the new machine the controls are undoubtedly more sensitive, the warp particularly having a much greater effect than on the 50-Gnome. Consequently the movements I made rather overdid the controlling, and the machine wobbled a bit more than it really should have. However, it was only about a one-minute's job to get the hang of



A snapshot of Hucks and his passenger, Mr. Harold Barlow, seated to the right, taken on Monday morning of last week just before they set out from Issy to fly to London on their new two-seater Blériot.

he feeling of the *cloche*. We also took another little stunt round later on, this time with a passenger aboard in the person of M. Baffier, Blériot's representative down there. Steering towards the Eiffel Tower, we had reached to within about a hundred yards of it when suddenly we ran into a dense cloud, which was not very cheering, by reason of the possibility of hitting the structure. I turned round sharp at right angles, and in a few seconds we were in clear air again, only, however, to run into another. This time I switched off suddenly and did a steep *vol plané* to get out of it as quickly as possible. This process rather unnerved M. Baffier, I am afraid, for I had promised faithfully not to dive the machine down steeply without giving him very complete and due warning. He was a bit excited when we landed at Issy, but I believe he thoroughly enjoyed it all the same.

The weather did not seem to improve a great deal, and as under the military regulations all the flying done at Issy must take place before 10 in the morning, we reckoned on having to wait until the next day.

Next morning we were down there again very early. It did not get good enough to start until after breakfast at about half-past eight. We very soon had the tanks filled, and obtained the necessary permission from the commanding officer of the troops drilling there to start. We got away at 9.15. Looking back now, that part of the whole flight, from Issy to Meru, a point about twenty miles north of Paris, was undoubtedly the most difficult, for there seemed to be nothing from which one could take one's true direction.

Not until you get to Beauvais have you any landmarks you can use with any degree of certainty. From Beauvais onwards for some little way the conditions settled down. There was hardly any wind, it was perfectly clear, and we went spinning along merrily to Amiens about 3,000 ft. up. From that place to Abbeville the way is comparatively easy to find, for you follow the railway, on each side of which is a consistent stretch of swampy land. In spite of the altitude, we began getting *remous*, owing to these swamps. Bumps occurred now and again, and suddenly the machine would wobble, and take a little dive. This sort of thing got so frequent that I had quite a difficulty in maintaining pressure in the petrol tank. These *remous* and bumps would come so unexpectedly that it was quite a difficult job to pump with one hand and control the machine with the other. It was a sort of patting-one-knee-and-rubbing-the-other type of movement. One had to wait for lulls in the wind to carry out this business. From Abbeville to the coast line it got steadily rougher, and we kept getting into sea fogs. The machine began to feel it a good deal. Pumping here became very intermittent indeed—but it was done, weather and other circumstances permitting.

Owing to the description I had had given me of Hardelot when I left, I went clean over that place and missed it, because I was told that Hardelot itself, a little hamlet, was three miles from the shore, that there was a vast expanse of sand, and that the Blériot hangar stood out prominently. I saw what appeared to be about twelve houses on the shore with absolutely no sand at all, and thought it could not be Hardelot. I continued on until I got within a mile of Boulogne, and discovered that the beach then turned into cliffs, so I knew we must have gone by. In turning back we seemed to get right in amongst the clouds, and had a terrible buffeting about. There was not much beach to land on at Hardelot, for the tide was right up. Just on landing a gust took her up about 30 feet, and if I had not switched on should have had a thorough smash, because the wind was terrible, coming up from the shore and striking the *plage*. The second attempt at landing was ideal, for we got down practically without a bump.

Tremendous excitement was caused at Hardelot. Everyone seemed to stop work and take a half-day off. Some labourers that were working on a building near by immediately downed tools as soon as the machine came in sight, and as far as I can remember they did not return to their job for the rest of the day. What surprised me most on landing was the strength of the wind. The foam was flying up, and the grass was lying quite flat. I should think it was doing quite forty, and I thought for a moment what sort of time one would have flying over England in a wind of that speed. We had covered the journey of 168 miles in 145 minutes. It blew strong there the rest of the day, and did not quieten down until about six o'clock on the next evening. I considered the conditions were good enough to make a start on Tuesday night. We had the machine filled up, and got as far as Boulogne, but the clouds were so low, not more than 500 ft., that before we had gone five or six minutes we were clean in them. It was a very curious sort of feeling, for the only indication of the attitude of the machine was the note of the engine, and, of course, the revolution indicator. Naturally this sort of thing was not good enough for Channel flying, so we turned back to Hardelot again. I spent the rest of the evening giving passenger flights to the people staying at the hotel. Amongst them was Mr. St. John Harmsworth, Lord Northcliffe's brother, who, through a motor accident some few years ago, had had the sad misfortune to lose nearly all the use of his limbs. He was lifted out of his bath chair by attendants, and placed in the passenger's seat. I think we managed to give him a good flight, for he came back absolutely bubbling with enthusiasm. To my remark that he was wonderfully plucky to take the trip, he replied, "Well, I have been smashed up in a motor car, and don't see why I should mind the risk of the same thing happening in an aeroplane."

We went to bed early, leaving the machine fit for starting off in the morning. Turned out at four o'clock, and most of the servants of the hotel also turned out to see us off. The "boots" started us up. Had been doing it all the previous evening. He was a very hefty youth. Altogether the hotel waiters and "boots" did very well, for they held the machine back and behaved excellently. At 4.15 we were off, and the conditions were absolutely ideal. Over the Channel it was beautiful, for from Gris Nez I could easily see the English shore, while, at any moment, had anything happened, I could have planed down near a boat, for the Channel seemed literally dotted over with craft of different kinds. The only thing that kept me from going to sleep was my catching sight of my passenger's shadow on the wing. He seemed to be getting rather restless, and was bobbing up and down. It occurred to me that he was probably trying to find a place that wasn't windy, so I did not trouble a great deal. The actual time over the Channel was 19 minutes.

As we were getting near Eastchurch I noticed a peculiar sort of vibration setting up in the engine. The gauges and things which had all been steady began to vibrate, showing that something in the engine was amiss. We reckoned on going straight for Hendon, but about two miles to the west of Eastchurch, without any warning, the engine stopped. However, within a second it took up its running again, but having lost 300 or 400 revs. per minute. Managed to plane down on to the Eastchurch ground, where the engine was taken in hand by one of Mr. Horace Short's Gnome experts. He found four inlet valve-springs out of the seven were broken. The naval men there were somewhat disappointed with our appearance, for they had been expecting their new Breguet over that morning, and hearing the buzz of an engine approaching, naturally thought it was their machine coming over by way of the air. Eventually we got away from Eastchurch at about a quarter past seven, and followed a course due west from Sheppey, keeping about ten miles south of the river. Over the Crystal Palace the clouds were passing overhead like a black curtain, and we seemed to be so near them that one could almost put one's hand out and clutch a handful of cloud. Just on the fringe of Richmond Park we branched off at right angles, crossed the river at Putney and got back to Hendon by the usual route that one covers in flying there from Brooklands. We landed at 8.40.

As for cross-country flying itself, I reckon it puts aerodrome flying in a seat very much to the rear. It really shows up the utility of the aeroplane, and then of course you have the personal satisfaction of having accomplished something. Besides that, it is after all the cheapest way of shipping an aeroplane from place to place. For the monoplane and the way she behaved I have nothing but the highest praise.

B. C. Hucks

"Flight" Copyright.

B. C. Hucks off for tea at Hendon after a flying exhibition.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Balloon Contest at Hurlingham.

THE third Balloon Contest will take place at Hurlingham, on Saturday, July 13th, 1912, when the cup presented by Mr. A. Mortimer Singer will be competed for.

The entries will close on Wednesday, July 10th, 1912, at 12 o'clock noon, and Members wishing to compete are requested to notify the Secretary on or before that date. The entrance fee is 10s.

Members of the Royal Aero Club will be admitted to the Hurlingham Club free, on presentation of their Royal Aero Club membership cards.

Members of the Royal Aero Club can obtain special vouchers for the admission of their friends, who are not members of the Royal Aero Club, to Hurlingham, from the secretary of the Royal Aero Club. These vouchers will admit on payment at the entrance gates.

British Empire Michelin Cup No. 1.

(*Under the Competition Rules of the Royal Aero Club.*)

The winner of the prize of £500 for the year 1912 shall be the competitor who, on or before October 31st, 1912, shall have remained the longest time in the air on an aeroplane in one flight without touching the ground. The flights may only be made between the hours of sunrise and one hour after sunset, and in order to qualify for the prize the competitor must make a continuous flight of at least five hours.

The entrant, who must be the person operating the machine, must be a British subject, flying on a British-made aeroplane, must hold an Aviator's Certificate, and must be duly entered on the Competitor's Register of the Royal Aero Club.

Rules and entry forms can be had on application to the Club.

British Empire Michelin Cup No. 2, £600.

(*Under the Competition Rules of the Royal Aero Club.*)

The contest for the current year consists of a cross-country circuit of about 186 miles. Competitors may choose their own course, which must be previously approved by the Club. The competition is now open, and the rules and entry forms can be obtained from the Royal Aero Club.

Presentation of Pictures.

Sir David Salomons, Bart, has very kindly presented to the Club a coloured engraving entitled "Retour des Aristocrates de la Course de Londres, 1794."

Mr. Philip Gardner has very kindly presented to the Club a Portrait in pastel of Monsieur Charles, a pioneer French Aeronaut.

French Hydro-Aeroplane Meeting.

A Hydro-Aeroplane Meeting will take place on August 26th, 27th, and 28th, 1912, in the Bay of St. Malo. 38,000 francs are offered in prizes, and among other events, there will be a Hydro-Aeroplane Race, on August 28th, from the Bay of St. Malo to the Isle of Jersey and back.

Aviation Lantern Slides.

The Royal Aero Club has acquired a large collection of lantern slides dealing with aviation, and members can hire these at a nominal fee.

In order to make the Club collection more complete, the Committee will be glad to receive gifts of slides, and negatives or photographs from which slides can be made.

166, Piccadilly. HAROLD E. PERRIN, Secretary.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

EASTCHURCH is daily becoming more and more busy, and bids fair to become at least the second largest aerodrome in England, when the Naval School becomes established and the new quarters and hangars completed. It is also becoming an "aerial halt" for cross-Channel flyers, no fewer than six machines having landed there during the past few weeks, including the Naval Deperdussin and others, piloted by Messrs. Hamel, Hucks, Guillaux and Valentine. The past week has been a little trying as far as the weather was concerned, but when fine intervals have presented themselves they have been made best use of.

On Monday last week Mr. McClean started at 3.30 a.m. for Eastbourne on his 70-h.p. tractor biplane, making the journey *via* Tunbridge Wells (his native town), over which he circled once and then headed for Eastbourne, where he landed after a flight of 1 hour 17 mins. Later in the week he took up a photographer, with a view to photographing the sunken liner "Oceana," which feat was successfully accomplished.

The Austrian monoplane "Etrich" arrived *via* road, was unpacked and assembled; this machine is the one ordered by the Admiralty. Tuesday opened with very gusty winds until the evening, when Herr Steugler, the Austrian flyer, took out the Etrich monoplane for an hour's test flight with Lieut. Grey as passenger; this was accomplished without any difficulty, neither the warp nor elevators having been once touched during the flight except, of course, on rising from the ground and descending again; the machine was, however, rather strange to watch, as she had a fair amount of lateral movement in the gusty wind the machine, however, always righted itself. Capt. Gordon and Lieut. Hewlett took out the school biplane T 1 in turns doing solos, accompanied by Lieut. Gregory on the triple-twin biplane; Captain Gordon afterwards took Miss Malone for a short flight, ending with a *vol plané*.

Several naval pilots on Wednesday were early on the ground. Lieut. Gregory had a short instruction on the handling of the Etrich monoplane, and then essayed a twenty-minute flight, he, however, was a little late in flattening out, and damaged a skid and propeller when landing. Lieut. Malone was out on triple-twin T 3, Capt. Gordon on school biplane T 2. At 5.30 a.m. Hucks appeared on Mr. Barlow's new two-seated Blériot, having just crossed the Channel *en route* for Hendon, he landed at 5.33 and apparently was somewhat lucky in reaching Eastchurch, as the engine was not running well, and on dismantling valves, four inlet springs had broken, these were repaired during the day while the wind played its usual tricks and in the afternoon Capt. Gordon and Lieut. Grey were taken up as passengers and at 7.10 p.m. Messrs. Hucks and Barlow set out for Hendon.

Mr. Alec Ogilvie was out on the Wright with Mr. Fowler as passenger, and after climbing to a height of 300 ft. was confronted with a sudden stoppage of the engine, necessitating a rather quick and steep descent, as several dykes had to be avoided. The landing was accomplished without any damage, and an inspection was then made of the engine. It was found that the Roots blower had seized. This was set right, and she was ready for work again on Friday.

On Thursday practically no flying was done, Lieut. Malone only going out for a short spell on the T 3 machine.

The new Admiralty Farman hydro-aeroplane arrived on Friday. The machine is a large improvement on the older pattern machines of the same make, having the tail and front elevator main spars of light steel tubing of the usual section; the tail spars now meet at the rudder instead of being a square end as heretofore. The pilot and passenger are considerably more forward of the planes than usual, the pilot being within arm's reach of the front elevator. One thing that strikes one is the enormous quantity of wire strainers on the machine. Lieut. Grey was out testing the 70-h.p. Short tractor biplane, the machine having had the under-carriage and planes repaired since the accident at Rainham, when Lieut. Grey was forced down through fog.

The naval machines and pilots were out practising on Saturday. Commander Samson flew a 70 biplane to Dover with Lieut. Malone as passenger. In the early morning Guillaux arrived on the Caudron biplane but departed for Hendon after short stay. In the afternoon the Hon. Maurice Egerton took out his triple-twin Short, and Mr. Jezzi was busy passenger carrying on his little tractor biplane with 35 J.A.P. engine, carrying no fewer than seven passengers in turn, including a lady and Messrs. Maurice Wright, Sparks and Dawson, also Mr. Oswald Short and Fowler. Mr. Ogilvie took advantage of the calm and tested his N.E.C. since overhaul and found the machine to be going as well as ever.

Sunday obliged with incessant wind and so prevented any flying.

Commander Samson on Monday was out in a 30-mile wind at bomb-dropping practice, and made some very good shots, being within 3 and 4 ft. of an 18-in. target. Capt. Dunne took out the

Dunne monoplane (illustrated in last week's FLIGHT) to show Mr. Valentine, who, by-the-bye, had arrived on his Bristol monoplane *en route* for the motor Grand Prix, and while demonstrating the machine the engine started to give trouble, and he was obliged to land down wind, with rather serious consequences to all except Capt. Dunne and the Gnome engine, both of which came out untouched, which is rather remarkable, since the speed of the machine could not have been far short of 75 miles per hour, as a strong wind was blowing at the time.

Brooklands Aerodrome.

ON Wednesday morning last week all schools got to work soon after dawn. On the Bristol biplane Bendall started with a solo, then taking up Holyoake. Hotchkiss was testing the monoplane which is now fitted with a V-type Anzani. The machine flew strongly, but unfortunately came to grief later when under the charge of Bettington, who made a bad landing and, failing to stop the engine, broke the propeller and slightly damaged the Anzani. In the meantime Anderson was busy with straights on the biplane and Hotchkiss took Wilmer for several flights. At the Sopwith school Raynham took up Wadham for instruction after a solo, then handed machine over to Herbert, Hedley and Powell, all of whom did excellent circuits. Howell was then up for straights showing great improvement. Sippe made several flights for engine tuning purposes on the little Hanriot about 500 ft. up. In the evening everyone was kept in by the wind except Moorhouse, who made a short and very bumpy trip on his monoplane.

On Thursday morning no machine was out except the Avro on which Parke made a short flight, the wind preventing anything further. In the evening the wind continued to keep up. Hotchkiss and Bendall both made short trials but could not proceed with school work. Sippe flew for a few minutes on the Hanriot finding the wind bad, and Parke was testing the school Avro.

On Friday morning Hotchkiss was out solo and testing repaired No. 62. Agnew made some good figure eights, while Holyoake and Wilmer each did straights, the latter with Hotchkiss. At the Sopwith school Raynham was out first on the Farman and then on the Burgess-Wright on which he gave flights to Wadham, Herbert and Howell until stopped by the wind. On the school Avro Parke was testing, then Darracq for straights and Atkinson rolling. The Deperdussin *brevet* machine was also out with Gill and Bellairs. In the evening some short solos by Hotchkiss, Bendall and Raynham was all the flying the weather permitted.

On Saturday morning a considerable amount of work was got through. Sippe started away early on the Hanriot for Farnborough. He was very much bothered by a thick ground mist which caused him to make two landings to find his way. Just after he had left Vickers No. 6 appeared, having been flown from Erith by Macdonald with a passenger. At the Bristol school Agnew secured his *brevet* in good style, making a speciality of landing on the observers' mark. Bendall was up with Macdonald, Hotchkiss with Anderson on No. 62, while Holyoake and Wilmer both practised solo. At the Avro school Parke was first testing followed by Atkinson and Darracq. In the evening the wind remained high. Hotchkiss first made a solo and was then up with a lady passenger. Later Bendall took up Macdonald and Waldron for short trips. Lieut. Parke on the Avro did some short flights and then Atkinson some rolling.

On Sunday morning, Beatty took advantage of a short lull for straights on the Vickers, and Spencer put in a few circuits finding the wind very bad. In the afternon there was nothing doing.

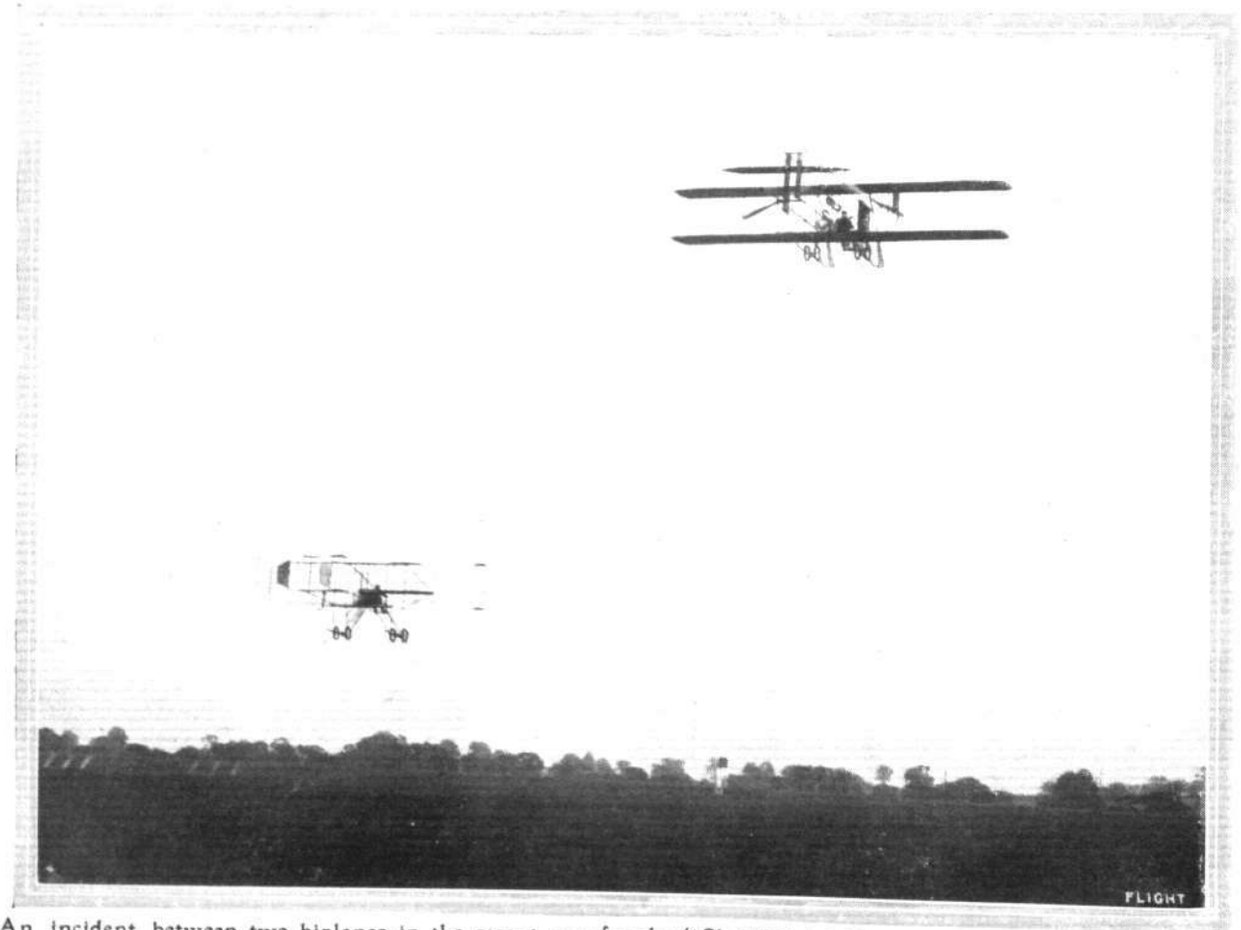
On Monday morning Raynham and Hotchkiss were both up for solos but were unable to proceed with school work owing to the weather. In the evening conditions remained the same and Hotchkiss, Bendall, and Raynham were only able to give pupils passenger flights. Parke was up for a short flight on the Avro and Atkinson did a little tail chasing.

On Tuesday morning a high wind early kept the majority in their beds, but those who had the energy to come out were rewarded with a lull between four and five o'clock. Gill was out with pupils on the Dep. as was Parke on the Avro. On the Sopwith-Farman Raynham, after a solo, gave instruction to Wadham while the good weather lasted.

Vickers School.—Capt. Darbyshire was out on Wednesday of last week for some time doing straight lines and landing well on Vickers No. 2. Capt. Wood was on No. 5 machine doing right and left-hand circuits.

Friday, Hunter was putting in straights on No. 2 to test the machine, and Capt. Wood was up on No. 5 doing circuits, right and left-hand.

Next day Hunter did two straights to test machine No. 2. which



An incident between two biplanes in the recent race for the "Shell" Spirit Prize at Hendon.—Lewis Turner on the Farman, and Raynham on the Burgess-Wright, travelling down the aerodrome.

was then handed over to Capt. Darbyshire, who was up for 45 mins. doing quite well and showing great improvement. Capt. Wood again on No. 5, doing circuits 200 ft. up, right and left-hand. No. 6 machine, piloted by the school pilot McDonald, arrived during the morning, having flown over from Dartford, accompanied by a passenger. The trip had taken 50 mins., on account of McDonald losing his way, caused through a very heavy fog.

Mr. Beatty was doing straight lines on No. 5 machine on Sunday, both flying and landing well. Hunter on Monday put in two straights to test machine before it was handed over to Capt. Darbyshire, who was then out for 35 mins., doing well.

Dover Aerodrome.

ON Saturday, the 22nd, Mr. Chalmers was flying with a passenger on his Farman biplane, driven by his Dutheil-Chalmers 60-h.p. engine. In the evening Commander Samson and Lieut. Lestrange Malone paid a surprise visit to the aerodrome on their Short biplane from Eastchurch. They were received by some members of the committee of the Dover Aero Club and were entertained at the new clubhouse.

Valentine arrived on the 24th late in the evening on his way to Dieppe, and stayed the night.

Eastbourne Aerodrome.

ON Wednesday morning last week everyone was away, and as is usual on such occasions the weather was perfect. Thursday morning Fowler turned up early and had the two-seater Blériot out. His flight, however, was not very successful as the engine commenced to miss almost immediately, and it was only with difficulty that he managed to get home.

Early on Friday morning McClean made two ascents, on one of which he was accompanied by Mr. Washington Wood. Mr. Fowler was also on the single-seater, both he and McClean making flights along the Eastbourne front. Although the weather was not particularly favourable, Mr. McClean decided to make his flight out to the wreck of the "Oceana." Leaving the aerodrome at 10 o'clock, accompanied by the *Sphere* photographer, he made one circuit of the ground, and passed straight out to sea, being quickly lost to view in thick banks of cloud. He was away exactly 35 minutes, and on his return was enthusiastically welcomed by a large crowd which had gathered on the ground. The "Oceana" lies 7½ miles off the pier, and as Mr. McClean made four circuits of the wreck to enable the photographer to take photos at varying heights, his performance was an extremely good one. In the evening Lieut. A. C. G. Brown, another new pupil, had his first baptism of castor oil.

On Saturday evening the weather conditions were perfect, and Lieuts. Bone and Brown and Mr. Gassler put in some good practice. Sunday evening saw them all out again, when Lieut. Bone took his first flight, which nearly ended in disaster to the Anzani. Lieut. Brown did some very good straight rolls the same evening.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—A good morning's work was put in Monday week, Baroness Schenk, Major Liles, and Capts. Salmond and Nicholas doing straights and Mr. Kershaw circuits on school 'bus, and M. Noel taking Mr. Cholmondeley as passenger for his trial—thirteen lessons in all. Evening too windy.

Tuesday morning hopeless. Evening very windy. Only work test flights by M. Noel on F3 and Mr. Turner on F5, and one lesson as passenger to Mr. Cholmondeley.

A windy morning on Wednesday, so pupils only making straights with M. Noel on board. Major Liles, Capts. Salmond and Nicholas, Commander Yeats-Brown, and Messrs. Scully and Hoelscher all out. In evening test flights by M. Noel and Mr. Turner showed wind too high for school work, next day being the same.

A good morning's work was got in on Friday on F31; M. Noel out for a test flight at 4.3 a.m., after which Major Liles, Captain Salmond, Commander Yeats-Brown and Mr. Fuller went for solo straights, Captain Nicholas and Mr. Hoelscher doing straights with M. Noel, Mr. Kershaw doing circuits, and Mr. Cholmondeley doing his first rolls. Meanwhile, Mr. Turner on F5 for a few test flights.

In evening, Commander Yeats-Brown and Captain Nicholas, and Messrs. Scully and Cholmondeley on F3, the latter finishing by catching the propeller on a bump while rolling—no fault of his, of course. Meanwhile, Mr. Grahame-White doing circuits and flying over surrounding country on F5, and M. Desoutter testing 35 Anzani-Blériot, now rebuilt after its smash.

No flying on Saturday morning; the rest of the day reported elsewhere.

Captain Nicholas was out on Sunday morning, and somewhat rashly attempted a straight at about 30 ft. Made a rough landing, carrying away chassis, and then rose to 30 ft. again. The second landing naturally wiped out most of the machine. Evening very rough, and nothing done but a few test circuits, and a very fine flight by Mr. Hucks on the new 70-h.p. two-seater Blériot.

Blériot School.—M. Gaudillon was the first to arrive at the School early on Monday morning last week, and before the wind rose at about 6.30 a.m., put in a couple of useful rolls across the ground and back.

Tuesday was very windy all day, no school work being possible. Next day it was very misty until 6 a.m, when the weather cleared and Messrs. Hall and Clappen were busy practising, the former doing one straight flight and then four circuits in a right-hand direction in good style. Clappen also got off the ground and kept going very well for two straights. The wind soon rose and put a stop to further work. In the evening Messrs. Barlow and Hucks arrived from Issy *via* Hardelot and Eastchurch, on the former's new tandem two-seater Blériot, making an excellent landing at 8.40 p.m.

Thursday was very windy all day, no pupils being out.

Early Friday morning Mr. Hall flew a couple of straights and M. Gaudillon essayed a roll across which he did very well, but the strength of the then rising wind prevented any further practice during the remainder of the day.

Saturday was very misty up to 6 a.m., when M. Aubert went up in the *brevet* machine and did two very good circuits in the left-hand direction. He then went up again and practising for his certificate tests, did one figure of eight and a couple more left turns, finishing up with a quite nicely banked right-hand turn. Mr. Hall meanwhile was out on the taxi and did a straight and a circuit, Messrs. Gaudillon and Sacchi—who has now resumed his practice after a long absence abroad—doing straights.

Salisbury Plain.

Bristol School.—The wind was too strong for test flights or pupils' work all day Monday last week, and the day had to be spent upon the machines and motors in the hangars.

A high wind and rain prevented any flying Tuesday morning, but late in the afternoon Busteed was testing a new monoplane recently received from the Company's works at Filton. Pizey was also out for trial flights, afterwards taking Messrs. Campbell and Geoffrey England for tuition on one of the Bristol monoplanes. Kemp was also on a similar type machine, and made a very clever flight, completing a couple of circuits, and landing with a good *vol plané*. Mr. Campbell was getting in some rolling practice on a monoplane, whilst Messrs. Rawson Shaw, Dr. Cordner, Mr. Lister, and Lieut. Hartree were out for solos.

On Wednesday morning there was no flying, owing to a thick fog, followed by a strong wind, which lasted all day. The only flight made was by Busteed, who went out in one of the Bristol monoplanes, having Pizey with him as a passenger.

No flying was possible Thursday until the afternoon, when Pizey made a trial on biplane No. 66a, afterwards going out on biplane No. 19 with Mr. Geoffrey England, then taking Messrs. Greig, Barnwell, and Hammond for flights on one of the monoplanes, Busteed in the meantime ascending on a biplane with Messrs. Barnwell and Greig. Mr. Kemp was busily occupied, first of all for a solo on biplane No. 66a, then giving tuition flight to Lieut. Christy, and then going for a practice flight on monoplane No. 58. Weather was considered too gusty for pupils' solos.

Mr. Pizey was the first out on Friday morning, ascending for a trial at an early hour, afterwards giving tuition flights to Messrs. Barnwell and England and Lieut. Christy. Mr. Smith Barry took Greig and Lieut. Christy for flights, Mr. Kemp also taking the latter pupil, and afterwards making a solo on monoplane No. 58. Messrs. Lister and Rawson Shaw and Dr. Cordner each made excellent solo flights with figures of eight and good landings.

Mr. Kemp made the first trial in the evening, then giving trips to Mr. Greig and Lieut. Christy, Busteed taking Mr. Barnwell, and Mr. Smith Barry taking Messrs. Featherstone and England. Messrs. Rawson Shaw and Lindsay Campbell made several good solo flights, whilst Messrs. Barnwell, Campbell and Greig put in some useful rolling practice on monoplanes. Mr. Smith Barry took up one of the Bristol monoplanes, and made a good flight, followed immediately afterwards by Mr. Kemp, who then went out on a biplane with Mr. Barnwell and also with Lieut. Christy, whilst Mr. Hammond took Messrs. Featherstone and Geoffrey England. Mr. Lister carried out two capital solo trips, as also did Dr. Cordner; Mr. Rawson Shaw ascended for one solo.

On Saturday, Busteed was first out in the evening, followed by Mr. Kemp, who took Lieut. Christy and Mr. Barnwell. Mr. Smith Barry made a good flight with Mr. Featherstone up behind and Mr. Hammond completed a couple of fine circuits accompanied by Mr. Geoffrey England. Major Boyd Moss was out for a good solo flight completing some exceeding clever figures of eight, with fine landings. Mr. Lister was also doing some sharp right-hand turns, and other solos were made by Lieut. Ashton, Dr. Cordner, and Mr. Rawson Shaw. Messrs. Campbell, England and Greig put in some very useful rolling practice on school monoplanes, Busteed bringing the day's work to a close with a trial flight on the new monoplane.

Sunday was hopeless, wind and rain preventing any attempt being made.

Royal Flying Corps.—A good deal of flying was done on Tuesday evening of last week when conditions were ideal. Capt. Loraine was on the Nieuport monoplane scouting around the Plains, and he was followed by Lieut. Porter who made a twenty minutes' trial at a good height on biplane F7, Corpl. Ridd on biplane F8, and Staff-Sergt. Wilson on F7. At 8.40 Lieut. Fox arrived at a height of 1,500 ft. from Farnborough on an Avro biplane, having done the journey in 60 minutes. He had had a head wind the whole distance.

Wednesday, wind and rain prevented any outdoor work before evening, when Lieut. Fox flew from Tidworth on a De Havilland machine.

Lieut. Fox started the ball rolling on Thursday by taking up Capt. Brooke-Popham as passenger on the BE3 biplane for a cross-country flight, which lasted for 3 hours. He was followed by Capt. Loraine on the Nieuport who put in 1½ hours scouting around the country at a good height, finishing with one of his graceful spiral *vol planés*, Lieut. Porter, with Strugnell as passenger, flying in good form. Ridd and Wilson made flights on biplane F7, and Lieut. Conner a fine flight on the Nieuport for 30 minutes. Lieut. Fox, on BE3 biplane, took up Carter as passenger, and on landing changed over to biplane F8 and took up another passenger.

On Thursday Capt. Allen was flying a biplane and made a somewhat awkward landing. No flying was possible on Friday owing to wind.

On Saturday, Capt. Fulton was flying the De Havilland biplane in good form and Lieut. Fox then took over the biplane and put in some scouting practice. Corpl. Ridd was on biplane F8 and Wilson on F7. Capt. Loraine made some fine flights on biplane F8 and also on the Nieuport. Lieut. Porter made several flights with passengers on biplanes F7 and F8. Capt. Brooke-Popham was receiving messages thrown from a machine flown by Lieut. Fox.

Sunday was another off day

Monday, Lieut. Conner was out on Nieuport B4. Lieut. Fox was flying BE3 biplane with passenger, and also tried the two-seater Blériot. Capt. Brooke-Popham was on the Avro biplane, taking up Lieut. Reynolds as passenger, doing some signalling with flags at a fair height. Lieut. Fox took off in BE3 biplane, and was up for 40 mins., being out of sight at times in the clouds. He finished with a beautiful glide to ground. In the evening Lieut. Fox made several flights on BE3 biplane practising dropping balls. He also took up a passenger and did signalling over Knighton Downs, Capt. Brooke-Popham was on the Avro biplane, Lieut. Porter was flying biplanes F7 and F8, Corpl. Ridd made a good flight on biplane F7. Capt. Burke arrived at 8.40 with a passenger, Lieut. Mackworth, on the factory biplane BE1, from Farnborough. He reported having experienced rough weather at a height of 2,500 ft.

Harbrows, of Bermondsey, London, are now busy putting up twelve temporary hangars for use in connection with the forthcoming Army Trials.

⊛ ⊛ ⊛ ⊛

AUTOMATIC *VERSUS* INHERENT STABILITY.

By EARLE L. OVINGTON.

IN the April 27th issue of FLIGHT there appeared an article entitled, "Gyroscopes on Aeroplanes," the article referring to T. W. K. Clarke's paper on gyroscopic control. As an aviator of considerable experience, and as an engineer who has done quite a little thinking on the subject of lateral stability of heavier-than-air flying machines, I should like to say a few words on the subject.

It is a question in my mind whether automatic stability, as applied to the lateral movement of an aeroplane, is desirable, even assuming that it can be accomplished. There is not much question but that some form of an automatic device could be devised whereby an aeroplane could be kept in a safe position as far as lateral stability is concerned. It is a question in my mind, however, whether such a device is desirable. Let me illustrate by an example.

We will assume that we are on one side of a deep chasm, a fall into which means sure death. The chasm is, say one hundred feet in width. Let us further assume that your advocate of automatic stability, by means of a gyrostat or other mechanism, is on one side of the chasm with me. Over this chasm stretches a narrow wooden pathway, perhaps three feet wide. I have two bicycles. One of them is an ordinary machine, while the other is fitted with a theoretically perfect gyroscopic balancing device, whereby the machine is prevented from falling over sideways. I say theoretically perfect. By this I mean it works perfectly under all circumstances, *so long as the different elements composing it are in good order*.

I now give your advocate of automatic lateral stability in aeroplanes the choice of riding across this narrow plank or pathway on one of the two bicycles I have at my disposal. In other words, he can use the ordinary mount and trust to his own brain and muscles to carry him safely past the danger, or he can use the automatically balanced bicycle, and in using it he would have to steer only in a horizontal plane.

Although the analogy is not exactly perfect, it explains at what I am driving. Is there any question which wheel would be chosen? Would anyone in his senses prefer a bicycle with any automatic device upon it in preference to the ordinary bicycle? I think there is no room for discussion on this subject.

To be sure, the automatically balanced bicycle would work so long as its elements were in perfect order, and the chances are that these elements would be in perfect order for such a short ride. However, *there is a possibility of them becoming deranged*, and in such a case *sure death would be the result*. On the other hand, any man who knows anything about bicycle riding would not hesitate to ride across a three-foot roadway, provided he was obliged to do so. And he could do it safely with an ordinary bicycle. I am assuming, of course, that he did not lose his nerve.

It seems to me that the experienced aviator is in about the same position with regard to the flying machine. He knows how to operate it and so long as the machine is structurally what it should be, and the controls in working order, he knows, that under normal circumstances, he will not meet with accident. Of course, abnormal conditions may arise and then an accident may result. On the other hand, these abnormal conditions would still be present with an automatically balanced aeroplane. In addition to this, the aviator would have to trust his life at all times to the proper operation of a series of mechanical devices. And there is no discussing the question that sooner or later, this automatic mechanism would refuse to "automat." So would a few of the automatic mechanisms within the aviator (after he had fallen a couple of thousand feet).

It seems to me that an automatic device to balance an aeroplane is not what is required or desired, at least by the experienced pilot. And by an automatic device I mean such a mechanism as a gyrostat or a pendulum which operates controls instead of the operator himself doing it.

I believe that the future of the aeroplane rests in the solution, among other things, of the problem of lateral stability. But I do not think that an *automatic* mechanism is what is wanted to accomplish the purpose.

I divide lateral stability into three classes. Manually obtained lateral stability, such as used at present, in which the personal equation of the operator is paramount. Automatic stability, in which the balancing is done by automatic device. Inherent stability in which *the machine is constructed in such a manner as to maintain its stability under all conditions*.

I understand that Mr. Dunne is striving to obtain the last-mentioned condition. I am firmly convinced that, sooner or later, we shall know enough about aerodynamics to construct a machine which is *structurally* and *inherently* stable laterally. This has been done so far as longitudinal stability is concerned, for a well-designed aeroplane of the present day is wellnigh perfect as far as longitudinal stability is concerned.

Take, for instance, my Blériot, with the inverse curve on the elevator. It is difficult to make the machine climb at a steep angle or descend on a steep *vol plané*. The tendency is to fly normally and when it is in this condition there is very little pull on the control. In other words, the longitudinal stability is almost all that could be desired. There is little tendency for the machine to settle on its tail, or plunge head foremost on its nose. Of course, such accidents have happened, but I believe it is due to the rupture of some element of the control or flying machine, or the sticking of a control.

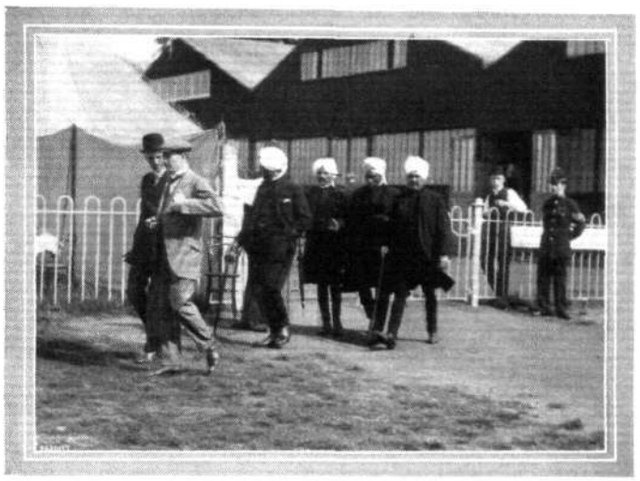
As an aviator, I much prefer to trust my life to my own brain and muscles than to trust it to any automatic device, and I believe that most aviators are of the same opinion. The men who are spending so much time inventing more or less complicated devices for maintaining automatic lateral stability in aeroplanes are largely those who belong to the "rocking chair fleet" of aviators. In most cases they are not practical flyers. I would hate, personally, to get into a machine and realise that if a certain automatic device did not operate, I would surely be killed.

I should like to hear the opinion of your readers on the subject. It is one which is of the greatest importance of the present day, and a problem which must be solved before the aeroplane can be practical in the full sense of the word. It is the one big problem before the aeronautic engineers of to-day. A free discussion in your excellent paper, it seems to me, would be of great advantage to all.

SECOND SUMMER MEETING, HENDON.

ALTHOUGH, as far as the competitions were concerned, last Saturday's flying at Hendon was marred somewhat by the high wind—strong gusts in the neighbourhood of twenty-five m.p.h.—some excellent work was witnessed, especially late in the evening.

It was not until four o'clock that any attempt at a flight was made, when Lewis Turner flew Grahame-White biplane No. 9 straight across the ground to the railway embankment, and, turning the machine round, flew back again. Having satisfied himself as to the state of the air, he then made a complete circuit. It was apparent from the manner in which the biplane rocked about, that the weather was by no means perfect for flying. At 4.30 p.m.,



"Flight" Copyright.

A visit by the King's Indian orderly officers to see the flying at Hendon. Capt. Tyrer is showing the officers round.

Hucks came out on his new two-seater 70-h.p. Gnome-Blériot monoplane and gave a very pretty exhibition flight of about five minutes' duration, at one time reaching a height of about 1,000 feet, then finishing with a *vol plané*. As Hucks came down, Hamel went up on his single-seater and indulged in some of his usual banked spiral *vol planés*. Verrier then made a solo flight on the Maurice Farman, making several startling switchbacks. After an interval of about twenty minutes, Valentine went up for a trial flight on the Bristol monoplane.

At about five o'clock the machines were lined up for the cross-country handicap, which event, however, did not go through in a very satisfactory manner. Although there were four starters:—Verrier (Maurice Farman), Valentine (Bristol), Hamel (B'ériot single-seater), and Hucks (Blériot two-seater), they all missed the mark at Elstree owing to the haze caused by the heat; we believe Verrier managed to find the mark on the first journey. Immediately after the last man was well on his way for the first round, two balloons were seen making their way towards the aerodrome. These turned out to be two of the competitors in the long distance contest for the challenge cup presented by Mr. F. Hedges Butler, the start for which had been made from Hurlingham. They passed almost immediately over the aerodrome just as Verrier was returning from his first round. Two more balloons were then sighted and at the same time Hucks, Hamel and Valentine were seen returning. When Hamel saw the balloons he gave up all intention of finishing the cross-country event, and made a wide circle round one of the balloons, which was then right over the aerodrome. He then again circled round the balloon, this time quite close so that he could easily recognise the occupants and exchange greetings. When he was tired of circling the balloons he rose higher and higher, finishing with a beautiful spiral *vol plané*.

At first it was intended to hold another cross-country race, but finally the management decided to divide the prize money amongst the four competitors. The next event was the grand speed handicap which started a little after 6.30 p.m. It was held in one heat only, the course being over four laps of the aerodrome, and with three starters:—Verrier (Maurice Farman), Hamel (Blériot), and Hucks (Blériot). Hucks was scratch, giving Hamel 32 seconds start, and Verrier 54 seconds. During the third lap Hamel retired, and Verrier seeing him leave the course, thought he was safe to win, and took his pylones wide, forgetting that Hucks was not far behind. The result was that Hucks passed Verrier at the finish, beating him by just over 10 seconds.

By this time the wind had fallen considerably, making conditions for flying much better, and up to past 9 o'clock there was hardly a moment when there was not a machine in the air. Just about 7 o'clock Hucks and Hamel both made passenger flights on their Blériots, the former taking Mrs. Craig for about 8 minutes and the latter Miss Davies for 15 minutes. Guillaux was also up on the new two-seater Caudron biplane which he had flown over from France with Mr. A. M. Ramsay. He was up for about 15 minutes flying very high. Verrier was busy making passenger flights while Turner, Noel and Hubert put in some solos on Grahame-White biplane No. 9. Hamel made another flight with Miss Davies of about 8 minutes soon after his previous one, and while he was up Noel took a passenger on No. 9. At 7.40 p.m. the three finishing bombs were fired and it was after this that probably the best flying that has been seen at Hendon—this season at any rate—took place, and it was a pity that there were not more people there to witness it. The sky had by this time attained a glorious aspect, for the sun was just setting. One after the other the machines rose until there were no fewer than seven of them in the air at once. These consisted of the two Deperdussin monoplanes—the two-seater and the single-seater—the Maurice Farman, the Grahame-White Farman, the Caudron biplane, the Howard Wright biplane with Grahame-White smoking a cigarette and the Bristol monoplane. It was indeed an imposing sight to see all these craft circling the aerodrome together. Verrier on returning to *terra firma* made one of his picturesque slow glides. Even after this, and by this time it was getting on to 9 o'clock, a little more flying was seen, the Deperdussin taking up a passenger as also did the Caudron biplane.

Grand Speed Handicap (4 laps).
Prizes presented by Mr. P. Teofani.

	Start.	H'cap. Time.	Net Time.
	m. s.	m. s.	m. s.
1. B. C. Hucks (70-h.p. Gnome-Blériot)	Scratch	7 10⅘	6 16⅘
2. Pierre Verrier (70-h.p. Renault-Maurice Farman)	0 54	7 21	7 21
3. G. Hamel (50-h.p. Gnome-Blériot) ...	0 32	Did not finish	

"Flight" Copyright.

W. H. Ewen, "the Flying Scot," who is flying in the North in connection with the educative tour of the *Daily Mail*, in the pilot's seat of his new Caudron biplane. It was this same machine on which Guillaux flew over from Paris on Saturday, with Mr. A. M. Ramsay as passenger.

AIR EDDIES.

THE Caudron works at Crotoy have got more on hand than they can comfortably tackle. Besides their French orders—and they have been receiving quite a lot of attention from the French Military authorities of late—a very appreciable amount of business is coming from England. Just recently machines have been supplied to a customer in Scotland, to Percival at Brooklands, and then there is one, a hydro-biplane, coming along for Grahame-White. No doubt the performance by Guillaux in the Aerial Derby, and the good impression it left behind, will help matters along still further.

* * *

Then, of course, we might take into consideration that there is a persistent rumour around that the Caudron Brothers have got their minds set on capturing the world's speed record, that they have a machine nearly ready if not quite, and that they can just carry it off when they choose.

* * *

I have had a letter from Frank Champion outlining what's been doing lately out at Long Beach, California, and sending his best regards to his many friends in England. He says, "I have a brace for my leg now, and can get around pretty well, only it makes my knee rather sore and I still have to use crutches occasionally to ease it (it will be remembered that Champion has been laid up and prevented from flying for several months through an accidental gun-shot wound in his leg). Had a little spin last Sunday, June 2nd. A fellow that was giving a two days' exhibition here, Frank Stites by name, fell and broke himself up pretty badly, and they came along to me and wanted me to finish the contract.

* * *

"My old machine was out in the hangar at the Dominguez field, where she had been for five months, ever since I was shot. They didn't come to ask me to help them out until seven o'clock on Saturday evening. Gee! but I had to hustle, as I had only eighteen hours to prepare, and ten of those were night time. The machine was all in bits. The magneto was in Los Angeles and no one knew where it was excepting Remington (Remington has partnered Champion in his flying) and he was seventy miles away. Got him on long distance line and dug up its hiding place. Had no mechanic, so collected together a few of the cubs to help me to put her together. Tried the engine and she ran fine, so got aboard and without any preliminaries started for Long Beach.

* * *

"But it was good to get into the air again. 'Stunted' all round the front at Long Beach, and got back to the aerodrome again inside of half an hour.

* * *

"Better send me over a new 50 h.p. Blériot for the American Circuit, and I will get the $25,000."

* * *

Two out of the three 50-Gnome-Avro biplanes ordered for the War Office have been safely delivered at Farnborough. The third is completed by now and will go through its preliminary tests at Manchester during the week-end, preparatory to it being flown direct from there to Farnborough. Lieut. Wilfrid Parke, R.N., will do all the necessary piloting, and I believe that he intends to take another pilot with him so that the efficiency of the Avro dual control can be put to practical test during an extended cross-country flight.

* * *

Some very interesting points reach us in connection with the tests which the two machines already delivered have gone through. The minimum speed permissible was 38 m.p.h. The machines delivered did 61. The climbing speed was to be in excess of 70 ft. per minute. The Avro did 440 ft. per minute—a very remarkable performance indeed, when one comes to consider that the engines are of only 50-h.p.

* * *

In the sand test the wings had to be loaded up with twice their normal load of sand. The machines in question were loaded up with three times their normal load. Then one of the main supporting wires was cut, without making the slightest difference to the machine.

* * *

Monoplane design has been settling down to such well defined lines of late that the particulars of the new Cody monoplane we are able to publish this week will come as quite a shock to those who have been reckoning that something like finality of design has been reached in aeroplanes of the single-deck type. Its immense size and marked originality were the chief characteristics of his first biplane. To Mr. Cody himself the same remark almost applies—he is no light weight, and there is certainly no one in the aviation profession that can boast of so original a personality as his. His new monoplane is no exception to the rule. It is all originality from propeller boss to the tip of the tail. As for its size, just glance over the photographs we print.

* * *

Out of fairness to Ewen I must correct my remark in last week's notes that he has occasional lapses of memory. It is really not true. His memory is as good now as ever it was. The fact is that the whole thing was caused by a little practical joke in the domestic circle. Neither Ewen nor myself got to know of it until after my remark had appeared in print. Then, of course, we fully understood.

* * *

Compton Paterson, of the African Aviation Syndicate, is going to fly at Durban during July. Things with them, so I hear from a friend of mine in S.A., are going very well indeed. Naturally it is to the Government they are looking for future business. In this respect, Capt. Livingston, the manager of the Syndicate, is just the man to get there, for if there is anything he is keener on than aviation it is soldiering, and we can leave it to him to suggest as to how the two things can be most advantageously combined.

* * *

Interest in things aviatic seems to be well on the increase in Ireland. Apart from the early pioneer work of Mr. Harry Ferguson and Miss Lilian Bland, and of course the temporary enthusiasm over the Leopardstown Meeting in 1910, nothing very exceptional had taken place until the recent flights by Corbett Wilson and Vivian Hewitt. Ireland soon ought to see quite a deal of flying, for Mr. M. Granville Loder has taken up the sole agency for Blackburn monoplanes, and as soon as he has established a school of aviation he intends to tour over the whole of the island, visiting all the main cities and giving free exhibition flights for the purpose of arousing a keener interest in the sport.

* * *

A convenient flying ground has been secured at Baldoyle, and it is proposed to equip the school with two Blackburn machines, one 50-h.p. Gnome single-seater, and a two-seater instruction machine fitted with a 60–80-h.p. Green. It is this latter machine on which Mr. Loder intends to carry out his tour. Mr. Hubert O'Connor, a well-known barrister-at-law, is at present engaged upon preparing the tour. He has already arranged for exhibition flights to take place at Maryborough, Waterford, Limerick, Galway, Sligo, Londonderry, Tipperary, Cork, Ennis, Ballinasloe, Bundoran, Belfast, Clonmel, Tralee, Athenry, Ballinrobe, and Enniskillen.

* * *

Writing of Ireland brings back painful recollections of the sad disappearance of Leslie Allen. During the past week leave has obtained in the Probate Division of the Law Courts to presume his death as on April 18th. Poor Allen's estate is believed to amount to about £7,000. The amount left over from the various legacies that he left is to be devoted to a fund for the benefit of his infant daughter.

* * *

The stained glass window which is to be erected to the memory of the late Hon. C. S. Rolls and Mr. Cecil Grace, in All Saints Church, Eastchurch, is to be unveiled by the Archbishop of Canterbury on Friday, July 26th. It has been designed by Mr. Karl Parsons, and those in London who would like to view it before it is taken down to Eastchurch can do so on Wednesday, July 3rd, at the premises of Messrs. Lowndes and Drury in the Munster Road, Fulham.

* * *

Flying from Paris to London is getting quite a common occurrence these days. Two pilots, both of them carrying passengers, flew over last week. One was B. C. Hucks, who brought over Mr. Harold Barlow on a new two-seater Blériot, and the other was Guillaux, who came over with Mr. A. M. Ramsay as passenger on the new 60-h.p. Anzani-Caudron biplane, which Ewen is using in his tour up north in connection with the *Daily Mail*. Details of Hucks' trip, from the pen of the pilot himself, will be found elsewhere in this issue.

Guillaux and Ramsay left Issy-les-Moulineaux at 6.10 on Friday morning last week and kept at a mean altitude of 5,000 ft. until they were within six miles of Crotoy, when they had to land through a shortage of oil. They resumed their flight at five o'clock in the evening, crossed the Channel, and came down at Walmer, in Kent. Oil and petrol got very low in the tanks, and as there was considerable difficulty in obtaining those commodities in the district they flew over early next morning to Eastchurch in order to fill up. There they arrived before the flight colony was fully awake, and they had to wait some little time before they could get the necessary fuel. Hendon was reached the same morning, and quite early, in fact the whole flight from Paris to London was made under 24 hours.

* * *

It is a pleasure to see that Mr. F. W. Merriam is back again as instructor to the Bristol school at Brooklands. It will be remembered that he had already served for about two months in that capacity.

* * *

Two of our best known aviators have this week renounced their bachelor freedom in favour of married life. On Tuesday last Mr. W. R. B. Moorhouse was married to Miss Linda Morritt. The ceremony was carried out at St. Paul's Church, Knightsbridge, Bishop Ryle, the Dean of Westminster, officiating. The reception was afterwards held at 17, Southwell Gardens, the residence of the bride's parents.

Claude Grahame-White's marriage to Miss Dorothy Taylor took place on Thursday at Widford Church, Chelmsford. After the ceremony the guests repaired to Hylands, the residence of Sir Daniel and Lady Gooch, where the reception was held. The happy pair afterwards motored to Brighton, where they joined the yacht on which they are taking their honeymoon trip.

"OISEAU BLEU."

⊛ ⊛

Ladies' Day at Hendon.

THE programme has now been drawn up for the Ladies' Aviation Meeting arranged to take place at the London Aerodrome, Hendon, on Saturday next. The principal items are as follows :—

3.30 p.m.—Cross-Country Passenger Carrying Handicap for men pilots, who must carry a lady passenger. 1st prize, silver trophy and 25 sovs. ; 2nd prize, trophy and 10 sovs. ; 3rd prize, trophy and 5 sovs. A silver commemorative trophy will also be given to the lady passenger of the winners of the 1st and 2nd prizes.

4.15 p.m.—Quick-Starting Competition, open to lady aviators only. 1st prize, trophy and 20 sovs. ; 2nd prize, trophy and 10 sovs.

5 p.m.—Exhibiton and Passenger Flights by lady pilots. A silver trophy will be given to each lady pilot who completes two circuits of the aerodrome, and in addition a very handsome trophy will be presented to the lady pilot who completes two circuits of the aerodrome while carrying a lady passenger.

The proprietors of the *Daily Mirror* have also presented a very handsome silver mirror and a purse of 30 sovs., to be presented to the lady aviator who, in the opinion of the committee, is held to have made the best flights of the day.

6 p.m.—A Speed Handicap to be run in heats of four laps, and a final of six laps :—1st prize, silver trophy and 20 sovs. ; 2nd prize, 10 sovs. ; 3rd prize, 5 sovs. At the discretion of the stewards of the meeting lady pilots may take part in this event.

From 6.30 p.m.—Exhibition and passenger flights will be given by Mr. C. Grahame-White and the competitors.

We understand that entries for the ladies' events have been received from Mrs. Stocks, Baroness Schenk, Mme. J. Herveu, Mlle. Marvingt, Mrs. Buller, Mrs. Hewlett, and Mlle. Dutrieu.

The *Daily Mail* Flying Tours.

THE unsettled weather of last week prevented M. Salmet from doing a great deal of flying, but on the 20th he made a most exciting trip through the gale, from Fowey to Liskeard. Owing to the wind M. Salmet was unable to land at Liskeard on his arrival there and was compelled to go 8 miles further on to Landrake before he could come down. He was so tired that he lay down by his machine and slept two hours and then made his way back to Liskeard, where all the shops had been closed and all the town turned out to welcome the aviator. On Saturday, the journey was resumed to Taunton, the 132 miles being covered in 88 mins. During this trip, M. Salmet passed over or round 17 towns and villages. On Monday he paid another visit to Weston-super-Mare.

So successful has this tour of M. Salmet proved that the *Daily Mail* has decided to supplement it by a similar series of demonstration flights in the Northern counties, and have made arrangements with Mr. W. H. Ewen, as mentioned last week, to make a six weeks' tour on his Caudron biplane, starting this week, his first visits after leaving Hendon on his way to the North being *via* Cambridge, Peterborough, Lincoln, Hull and so on, probably finishing with a flight from Blackpool to the Isle of Man.

The Next Brooklands Handicap.

IN connection with the car race meeting on July 13th, the Brooklands Automobile Racing Club have arranged the usual cross-country race for aeroplanes. The distance will be about 10 miles, and the prizes £50, £20, and £10, or cups at option, provided 10 entries are received. Entries close on July 6th.

The Navy's Farman Hydro-Aeroplane Arrives.

THE Farman hydro-aeroplane ordered by the British Government as a result of the recent competition at Monaco arrived during the week-end at Eastchurch, where it will be used by the Naval Section of the Royal Flying Corps.

⊛ ⊛

Photographing Submerged Objects.

ON Friday of last week, Mr. F. K. McClean successfully carried out his experimental flight for the purpose of taking photographs of the sunken P. and O. liner "Oceana" off Eastbourne. After receiving signals from the immediate neighbourhood of the wreck that conditions were favourable, Mr. McClean started off at 10 a.m. on his Short biplane accompanied by the *Sphere* photographer, Mr. Charles Cusden, and flew straight out to the wreck passing over it at an altitude of 900 ft. Making a circle of between two and three miles he then passed over it at 700 ft. while the wreck was subsequently passed over again at 500 ft. and 300 ft., photographs being taken each time. He then steered back for the shore and landed at the Eastbourne Aerdrome after being in the air for thirty-five minutes during which time Mr. McClean estimated that between 25 and 30 miles were covered.

A Map for Aviators.

THE Geographia Company, 33, Strand, London, W.C., have produced a map, showing the country thirty miles round London, which should prove especially useful to aviators when planning trips in the neighbourhood of the metropolis. The map has been prepared by Mr. Alexander Gross, and indicates the main and secondary roads, as well as landmarks and places where possible landings could be effected.

"Flight" Copyright.

Mr. Gustav Hamel on his Blériot in the cross-country contest at Hendon last Saturday.

FOREIGN AVIATION NEWS.

Long Cross-Country Trips on M. Farman Biplane.

LEAVING Buc at a quarter to four on the 18th inst., on his M. Farman biplane, Lieut. de Marny, accompanied by Sapper Jousselin, landed at Verdun at 5.33, having taken 1 hr. 58 mins. for the journey of 285 kiloms., the high speed of 143 k.p.h. being partly accounted for by a favouring wind. On Monday, Lieut. Cheutin, on his M. Farman machine, accompanied by Sapper Courrejou, went from Buc to Mailly Camp in a couple of hours, his speed being about 120 k.p.h.

The Michelin Target Prizes.

ON Saturday last a further series of trials for the Michelin Target prizes was held at Mourmelon. Gaubert on an Astra-Wright with the Riley-Scott apparatus, and carrying Lieut. Riley-Scott as passenger, scored two hits, while Lieut. Bosquet, the only other competitor, had trouble with his motor, and had to land after dropping one bomb outside the target.

A Quick-Firer for Aeroplanes.

AS a result of the collaboration of Lieut. Fequant and Lieut. Mailfert, it is said that the French military authorities have produced a mitrailleuse which has given good results when installed on the latter officer's 100-h.p. Farman biplane.

Mdlle. Dutrieu has a Mishap.

AFTER making a flight over Aix-les-Bains on Friday of last week Mdlle. Dutrieu apparently misjudged her distance in landing and crashed into the monoplanes of Beard and Mouthier which were standing on the ground, all three machines being badly smashed, Mdlle. Dutrieu fortunately escaping without any serious injury.

A.C.F. Hydro-Aeroplane Competition.

IT has now been decided that this competition shall be held on August 26th, 27th and 28th. On the first two days the speed trials will be held on a course in the Bay of St. Malo, while on the 28th a race will take place from St. Malo to Jersey and back.

Baron Pasquier Flies for Two Hours.

ON his Blériot monoplane at Etampes, on the 19th inst., Baron Pasquier was flying for two hours.

Doings at Hanriot School.

AT the Betheny Grounds on the 18th inst., Lieut. Marlin was flying on his Hanriot for an hour and a-half, while on the following day he made a lengthy trip over the surrounding country. On Friday he paid a visit to Mourmelon.

Mourmelon to Issy on a Nieuport.

ON his Gnome-Nieuport on Friday last Helen flew from Mourmelon to Issy.

A New R.E.P. Superior Pilot.

FOR his military certificate Lieut. Campagne, on his R.E.P. monoplane, made one of the tests over a course from Buc to Troyes and back on the 22nd inst.

Fine Flights at Pau.

ON his Blériot monoplane Sergeant Laurent was flying for an hour and a-half at Pau on the 18th inst., and two days later covered the circuit Pau-Mazerolles-Orthez-Pau at a height of 1,500 metres.

Good Flights at Buc Farman School.

AT the Farman school at Buc on the 18th inst., Lieut. Glaize was flying for one hour and a-half at a height of 800 metres, and fourteen other military pupils put up practice flights of varying duration. On the 23rd inst., Lieuts. Mouchard, Gigneux, and Lussigny, each made an hour's flight over the aerodrome, while Adjudant Hurard, during a trip of similar duration, passed over Versailles, St. Cyr, and Trappes, &c.

Etampes to Tourny.

ON the 19th inst. Sergeant Perretti, on his Blériot monoplane, and Lieut. Boucher flew from Etampes to Tourny, a distance of 250 kiloms., the former taking it as one of his tests for a superior certificate.

Juvisy to Mourmelon.

EMILE VEDRINES on the 18th inst. flew on a monoplane from Juvisy to Mourmelon in an hour and a-quarter, keeping mostly at a height of 1,500 metres.

Cross-Country on a Caudron.

IN spite of a 22-mile wind, Sapper Jacquemart passed the second test for his military *brevet* over a course from Crotoy to Laon and back, on a Caudron biplane. He flew mostly at a height of 1,000 metres.

Fast Flying on Clement Monoplane.

ON the all-metal Clement-Bayard monoplane, on which on the previous day he had flown from Issy, Gastinger on Saturday went on from Buc to Chartres, taking 45 mins. for the trip.

Death of Injured French Pilot.

LIEUT. ETIENNE, who sustained very serious injuries in a flying accident at Guyancourt, died on Tuesday morning shortly after receiving the Cross of the Legion of Honour.

To Dinner by Aeroplane.

HAVING received an invitation to lunch with the Colonel Commanding the Cuirassiers at Rambouillet, Lieut. Mauger Devarenne and Lieut. Couret decided to fly over on their Maurice Farman machines. They accomplished the trip in half an hour and subsequently returned in the afternoon to Buc.

High Flying at Vienna Meeting.

UNFORTUNATELY a couple of serious accidents marred the opening on Sunday of a flying meeting at Vienna, which was attended by several members of the Royal Austrian Family Imperial. Ehrmann, the well-known French monoplane pilot, was beaten down by a passing machine and sustained injuries to both legs, which necessitated an amputation, while he also had an arm broken. The outstanding performance of the day was a flight by Lieut. Blaschke who took two passengers up to a height of 3,500 metres (10,600 feet).

Prince Henry's Good Work.

IT is stated that on account of the interest he takes in aeronautics and the encouragement he has given to aviation meetings and competitions, the Faculty of Philosophy of Kiel University has decided to confer the title of honorary doctor on Prince Henry of Prussia.

New German Height Records.

ON the 19th inst., at Kiel, Hirth, on his Rumpler monoplane beat the passenger height record by going up to 2,500 metres. On Saturday also at Kiel, Caspar got up to a height of 3,250 metres.

A German Prize for Aerial Photographs.

IN connection with the flying meeting to be held at Gotha from August 17th to 19th, the Grand Duke of Saxe-Coburg-Gotha has offered a prize for the best photographs obtained from aeroplanes.

A Curtiss Hydro-Aeroplane in Germany.

PILOTED by Mr. C. C. Witmer, a Curtiss hydro-aeroplane was tested on Lake Constance on the 18th inst., with a passenger, Herr Kober of the Zeppelin Co. The machine, it is stated, has been bought for £1,300 by the Zeppelin Aeroplane Co.

A German Fatality.

WHILE flying at Doeberitz Camp on the 21st inst., Lieut. Falkenhayn fell a distance of 250 ft., and was instantly killed.

German Pilots and Machines for Turkey.

ACCORDING to reports from Berlin, the Turkish Government have purchased two aeroplanes from a German firm, and have also engaged two German officers to fly them, one of whom, Lieut. Jahnow, is to have charge of a school for teaching Turkish officers.

Entries for the Gould Prize.

WHEN the entries of the Gould prize (United States) closed on June 1st, eleven entries had been made. The competition is for the machines fitted with two motors, so arranged as to be worked either together or independently, and it will be held in the neighbourhood of New York, under the auspices of the *Scientific American*, on July 4th. The entries are described as Alleas Aeroplane Co., double biplane; Howard Gill biplane; H. Curtiss, Burgess biplane; Boland Aeroplane Co., biplane; Edward J. Elsas, biplane; H. W. Mattoni, multiplane; MacLeod Aeroplane Co., multiplane; C. H. Bowleigh, multiplane; George Beatty, biplane; Grover C. Loening, Queen monoplane; John P. Conkling, biplane.

Thanks from New Zealand.

THE committee of the Dunedin Aero Club, New Zealand, ask us to convey their thanks to the various model and accessory makers and dealers who responded to their request through FLIGHT for catalogues, &c.

FLIGHT TECHNOLOGY.*

* *The primary object of these articles is to promote discussion on points of technical interest, readers are, therefore, particularly requested to express their opinion on the points raised by the author.*

AEROPLANES AS MECHANICAL CONSTRUCTIONS.

IT has suddenly been brought home to designers and constructors of aeroplanes that the "tin clip" method of holding the various parts of an aeroplane together is not altogether sufficient for the stresses these parts are subjected to, and it is equally obvious, from the many different methods in use of constructing machines that these same designers are a long way off finality in design.

There seems to be a feeling amongst us all that monoplanes, as at present constructed are not everything to be desired from a mechanically sound point of view, and, indeed, the more one investigates the loading on wing wires and main spars the more does one feel concerned about machines of this type that are flying.

Up to the present the monoplane constructor has calculated the load on his underneath wing wires by taking the weight of the machine, and the angularity of the wire and finding this comes out at say, half a ton, has simply made everything "safe" by fitting about two or three ton wiring. I very much doubt if there is a single wire joint on any aeroplane in existence that is a quarter as strong as the wire itself, especially when the wire is bent round a bolt.

There is also too much guess work about the wing spars. Let us take the case of a monoplane of 46 ft. span with braced wing spars (*i.e.*, stay posts of an Antoinette-type), and wing wires from the centre of each plane to a point in the undercarriage 5 ft. below the fastening on the fuselage. Assuming the machine to weigh, fully loaded with petrol, passenger, and oil, 1,800 lbs., or 900 lbs. per wing. The usual *rear* spar is about 1½ ins. wide by 3 ins. deep (or less), and the wood is cut away leaving an H section of about ½-in. thickness everywhere. Now according to Eiffel it is possible for two-thirds of the lift to be taken by the rear spar under certain conditions. How many people would think, adding together the compression stresses due to the load on the under wire, the tension and load on the stay post wires, the stress due to head resistance (especially when warping it is a usual thing to warp one wing up, to make a quick turn), and the stress due to bending, that the total stress in steady flight comes to 3,000 lbs. per square inch in the spar, and the breaking stress of the wood is not more than 9,000 lbs. per square inch. Where is that allowance for flattening out after a *vol plané*, and after that what is the factor of safety?

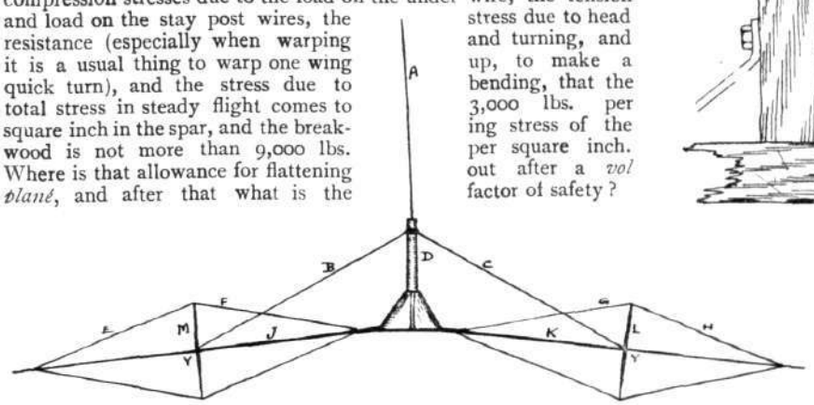


FIG. 1.

It is proposed in the following remarks not to go into the figures of the stresses in a machine so much as to investigate the broad principles of the various types of machine purely as mechanical structures.

Taking in their order the chief points about which aeroplane constructors differ, one must undoubtedly take the biplane and the monoplane first as being the most striking example, and one would say at a glance that taken simply as a mechanical structure the biplane is a considerable advance on the monoplane. It will come as a surprise to many to learn that the biplane as at present constructed is little, if anything, better than the monoplane, though slight modifications would improve it considerably.

Fig. 1 shows a monoplane upside down (this position being chosen to simplify explanations). Assuming this to be supported from above by the cable, A, and loaded with sand on the wings, the important stresses would be tension in the wires, B and C. Compression in the post, D, tension in the wires, E, F, G, and H, combined compression and bending in the main spars, H and K, and compression in the stay posts, L and M.

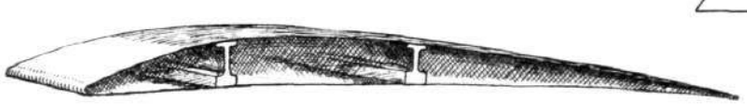


FIG. 2.

These stresses are simple to find, knowing the weight of the machine, and the increase due to flattening out after a *vol plané*, and it is not the intention of the writer to go into these here, the foregoing being quite sufficient for purposes of comparison.

Should any single one of the stress-wires break, a complete failure of the structure is certain to occur, excepting perhaps the stay-post wires, E, F, G, and H, when, if the wing main spar happened to be strong enough at the point, Y, to support the load without the use of the stay-post wires, the pilot could possibly make a landing in safety. As it is obvious that the structure fails on any one breakage, an exceptionally large factor of safety should be allowed in machines of this class, and a rigorous search made for the "weak link" in the chain. The stresses are considerably increased by the adoption of the dihedral angle of the planes, and it ought to be mentioned here, perhaps, that as the stresses of real importance in the wing-spars are *compression stresses* a light box or H section is useless as it is sectional area of material that is necessary.

True, it is stiffer to have a suitable section, but even then the area of the material must be sufficient for the compressive stress. If an H section beam is used it should have a greater amount of sectional area at the bottom as shown in sketch, Fig. 2, as the compression due to bending is added to the normal compression in the strut, also it must be remembered that ash (which is the material generally used in wing spars), is only about half as strong in compression as in tension. These remarks do not apply to the centre of the spar where the stay posts are fitted.

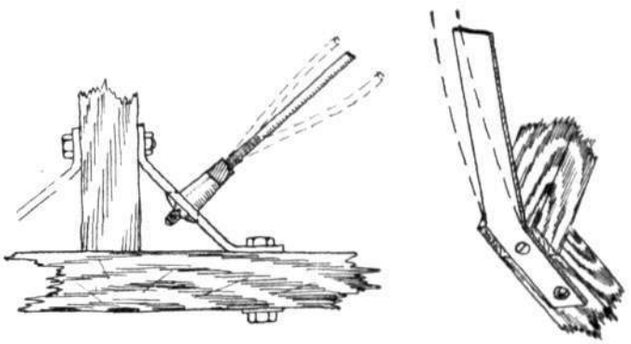


FIG. 3.

Another point of great importance is to see that all wires and metal fastenings have "free" ends to prevent the fibres of the wires having to bend some thousands of times per minute when vibrating—and they always will vibrate. By this, the writer means that rigid clips of the type shown in Sketch 3 should not be used, the position taken up by the wire when at the point of maximum vibration being shown dotted and the bend in the wire occurs at X. This is the only one instance of how fractures may occur which could be easily avoided when designing fittings. Various items of this nature may cause fracture in the air even when the wires are otherwise amply strong for the load.

A biplane, also upside down, is shown in Fig. 4. The main spars, A, are in simple tension, and the spars, B, are in compression, the maximum stress being at point C and D. The stress in these spars varies as the square of their distance apart (their extreme fibres); it is therefore advisable to have this as great as possible. The whole of the lift of the lower plane when in flight is transmitted through the medium of the vertical struts to the upper planes, and the lower plane main spars take their portion of the load in the form of a tension transmitted from the upper plane by the diagonal wires, E. Neglecting details, the compression on the upper plane spars will be exactly equal in lbs. to the tension in the lower spar, and as it is

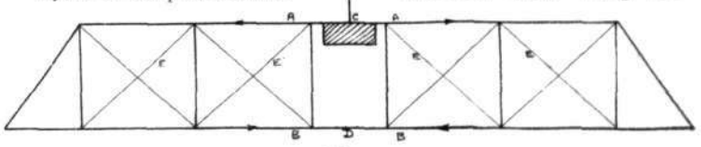


Fig. 4.

general practice to use ash for spars, and general knowledge that ash is only about half as strong in compression as in tension, it follows that the spars in the *upper* plane should have about twice as much sectional area as the spars in the lower plane, excepting, of course, the point in the lower plane which carries the engine and pilot. In this case a "local" increased bending moment occurs chiefly on one side of the engine only, the other side being probably more than balanced by the lift due to engine torque.

It would thus seem that given a vertical distance between the main planes of the biplane equal to the distance between the wing supports and lower wire attachments in a monoplane, and all other details being equal there is nothing to choose between the two types.

There is the important difference in that instead of the usual wires in a monoplane the lower plane spars take the tension load, but even then the advantage is doubtful, as wires are stronger for the same weight, and this is accentuated if the lower spars on the biplane are cut into or drilled for strut and wires.

The great point in which the biplane is superior to the monoplane as a mechanical structure is in the fact that quite a number of fractures can occur without anything like a collapse of the structure.

The reason is explained in the following:—The strength of a biplane as a girder is governed chiefly by the distance apart of the

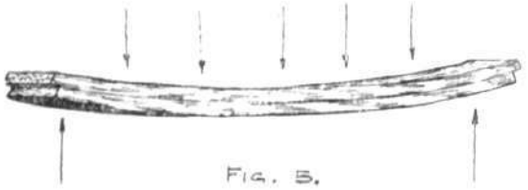


FIG. 5.

upper and lower planes. Now, in machines as at present built, this distance is so great that there is practically no tendency to bend the fibres in the spars, but there is a pure tension in the one and compression in the other. If these two planes were placed directly on top of one another with no space in between them the spars would immediately bend under the load, and to bend would have to slide on one another. Sketch 5, of two wooden beams of equal length, shows what I mean. Continuing, the plane spars in a biplane, despite their distance apart, would also tend to slide with respect to one another, and the structure would be robbed of practically all its strength if provisions were not made to prevent this sliding, which is, of course, done by means of the cross bracing.

Now it is fairly safe to assume that the cross bracing is amply strong to prevent this tendency to slide and it would no doubt be quite possible for the planes to support the load with quite a number of the cross bracings wires severed. In fact, if the two tubular diagonal supports for the extension in military-type biplanes and the vertical struts were intact, it is doubtful if anything very serious could happen. Of course, if either of the main spars collapse under the load, disaster is practically certain, but even then, if the machine is cross-braced from the front, upper, and lower spars to the rear lower and upper spars, the abnormally stressed spar is supported in a certain measure by the other three spars. And another point of advantage in this kind of structure is that as the centre of pressure travels towards the rear spars, the front spars still take a fair share of the load by means of the cross-bracing just referred to and the vertical struts.

Of course, the vertical struts run only from the lower plane-spars to the upper plane-spars, and it is a point of real importance in designing to see that substantial ribs are fitted in the planes just at the points where vertical struts are fitted, or the structure loses a great deal of its strength. These ribs should be quite equal in strength to the vertical struts, and must be of a section many times greater than the struts themselves, according to their curvature.

Coming to the design of fuselages, there are so many different methods in use at the present time that it is impossible to take any but a few of the best known ones.

In the first place, any fuselage, no matter what section it be, that is braced with wires in tension is distinctly bad. The chief reason is that initial stresses are put into the structure before any of the loads it is designed to withstand have been applied, and as a mechanical structure it is, by reason of its very design, robbed in the making of a considerable portion of its strength.

Secondly, it is usually found necessary, and especially in old machines, to put considerable tension on the bracing-wires, in order to keep the tail straight, or to remove any sag or twist in the fuselage itself. This considerably reduces the capabilities of the structure to resist shocks, and makes it "short" or brittle. It also fails at any weak spot should there happen to be one because the structure is inelastic, and any unusual stress is concentrated on the first point that will give at all, and this must sooner or later fail. By far the better fuselage is one with sides of sheet aluminium or multi-ply wood. This has the great advantage, as far as resistance to fracture is concerned, in the fact that all the parts are at rest and are not initially stressed so as to have all their elasticity removed as is the case of the wire-braced fuselage. It is not at all necessary with the built up types of fuselage to have diagonal struts or stay wires, as, of course, the sheet sides do all the necessary staying, but it is preferable to have a few vertical stays at intervals, and especially where the aluminium or multi-ply wood sections join, as without these the light sides would bulge and strength is immediately lost. Fig. 6 shows a type of fuselage that will withstand enormous shocks, and one of the best tests of this kind of structure the writer ever saw was the Martin-Handasyde on which poor Gilmour met his death. Despite the enormous crash (and the engine was buried three feet in the ground) the fuselage remained absolutely intact from behind the engine to the tail. A triangular section fuselage is not so strong as is one of square section especially to withstand twisting, but the square section fuselage must he braced diagonally inside (*i.e.*, across from spar to spar), and this should not be done with wires.

Undoubtedly the ideal section to withstand the varied loads a fuselage is subjected to is the circular one, but this is useless if made up of four spars boxed in with sheet aluminium or multi-ply wood as shown in the sketch, Fig. 7, because in the case of a bending moment the fibres furthest remote from the neutral axis are stressed to the greatest extent, and if the bending load happened to be either vertical or horizontal the thin covering would have to take nearly the whole load. If the covering has to be designed strong enough for this purpose then the four spars are superfluous.

A tubular section fuselage also is the finest possible to withstand a twisting load, but probably this would have to be made in steel, and in fact there are some in existence so made.

There is little doubt that behind the wing fastenings, at any rate, a fuselage has to withstand greater vertical loads than horizontal ones, and it is not uncommon to see a fuselage break in the middle, simply due to air pressure on the tail planes alone. This happened to Latham's Antoinette when he struck the roof of the shed at Brooklands. For this reason fuselages should be deeper than they are wide, and in the case of a circular fuselage this could have a spar running along the top and a similar one along the underside, preferably on the outside, because, as already explained, the extreme fibres are stressed the most.

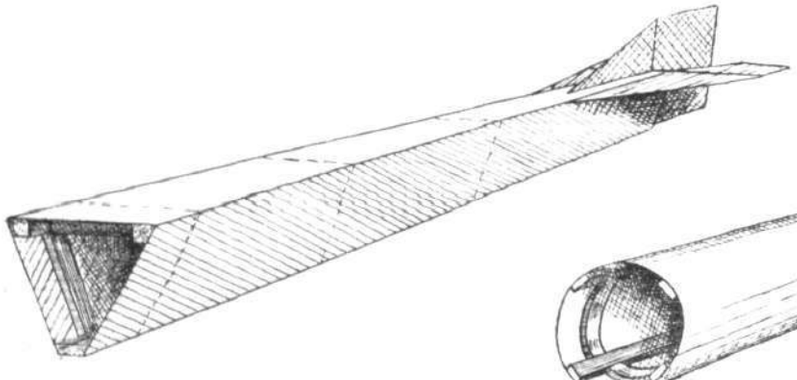


FIG. 6.

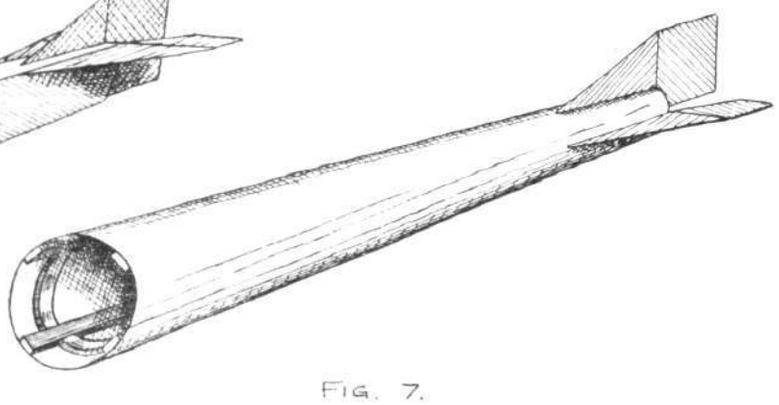


FIG. 7.

As in the case of the fuselage, the undercarriage should not under any circumstances be braced with tension wires. Probably the most important point in the whole design of an undercarriage is to see that the struts are properly designed to withstand compressive loads, and are inclined at such an angle that they will be parallel to the

direction in which the machine will most likely strike. From this it is apparent that the fast machine should have an undercarriage much further forward at the base than should a slow machine. A strut or post which is vertical from a side elevation is distinctly bad, and in many cases the wire holding it forward at the lower end has a much greater load to carry than has the strut.

Nothing shows a greater lack of knowledge of elementary mechanics than the majority of undercarriages which are being used in this country. One sees enormous beams, struts, skids and axles on machines simply because the materials are not used to the best advantage. Probably the strongest undercarriage in existence on well-known machines is the Nieuport, and no one will say it is not the simplest.

Nothing shows greater inefficiency on the part of the designer than an elaborate undercarriage.

Struts of streamline section are practically useless if strength per lb. of weight is of any importance, as the strength of such a strut is proportional to the square of the thickness across the thinnest place, and even assuming a strut to be bent across its deepest section its strength is considerably reduced by having a sharp trailing edge.

It is also *absolutely essential* that a strut is thicker in the centre, and tapers towards each end.

Designers often estimate what thickness of strut is required in the centre, and keep it parallel to the ends to save labour or trouble, or for some unaccountable reason, ignoring all the time the fact that it is weakening the strut to leave the material there.

Take a strut of the kind just mentioned, and put a compressive load on each end until the strut bends in the centre (which it will do). Now we all know without going into the mathematics of the problem that there is not the same tendency for it to bend towards the end as there is in the centre. Therefore the strut is considerably stronger everywhere else than it is in the centre, and for that reason the deflection is concentrated on the one spot, and the fibres are stressed to a much sharper angle than they would be if the strut were tapered exactly in proportion to the load each part of it had to carry. In this latter case the strut would assume the arc of a circle, and each particle of the strut would be bent a much smaller amount for the same load than in the former case. The struts should be of circular section, preferably, and should be made streamline, if it is desired, by some light material. It is practically as important *to avoid over strengthening in places as it is to avoid* weak spots.

This makes us again wonder why manufacturers connect their machines to the point of contact with earth by the agency of beams, girders, wires and strainers, &c. As a matter of fact, the probable cause is that they have thought out some ingenious method of springing, and have overlooked the whole point in the design in their endeavours to give publicity to their ingenuity.

If they neglected springing altogether, *except as a method of removing the wheels at the instant when it is required to bring the parts designed to take the shock into contact with the earth*, they would probably achieve a greater measure of success and incidentally relegate to the scrap heap about three-quarters of the weight they are lugging about in the air. It would be better for both the pilot and machine as well as for the scrap iron merchant.

It is very doubtful if any springing device, except for the purpose mentioned above, is of much real use on an aeroplane, and certain it is that the few machines that have been built without any springing device at all have been quite successful. The early Wrights, with skids alone, were quite a success, but of course one cannot very well alight on rigid wheels, and wheels are necessary nowadays. If the undercarriage struts are designed so as to be able to support, say 12 times the weight of the machine, then springs are useless unless they are about as strong (and they never are), because even with the springs removed the machine would alight successfully up to their load without fracture, and if with the springs they close up tightly the whole weight of the shock is transmitted to the struts. It is certainly true that with efficient springs the machine is brought to rest in a greater distance and the shock thereby reduced, but it is much simpler to design a strut to withstand the whole of the shock than to design springing devices as capable. A long well-designed strut will have enough spring in it to make the shock gradual (as far as stresses in the material are concerned) without in any way distressing the fibres of the strut, provided a landing is made that does not exceed twelve times (or whatever the strut is designed to stand) the machine's weight.

It should easily be possible to design four light struts that will stand 6 to 8 tons as a momentary load.

With reference to bolts used in aeroplanes, those subjected to tension stresses ought to be machined down on the unthreaded portion to the diameter at the bottom of the thread, or slightly less. This has been proved in numerous laboratory tests to increase the actual breaking load, and the writer has seen instances where the *increase* amounted to 150 per cent. or equal to 2½ times the breaking load of the ordinary bolt.

One can only come to the one conclusion, and that is that aeroplanes as at present constructed are not (except in very few cases) sound mechanical structures. It may be that the fault does not altogether lie with the constructor but with the progress made in plane design.

One manufacturer recently told the writer that he would be pleased to put in all the details I specified and work to my factor of safety on the condition that I did not specify that the machine had to fly.

GRANVILLE E. BRADSHAW.

⊛ ⊛ ⊛ ⊛

THE AERO ENGINE.

By G. H. CHALLENGER. (*Concluded from page* 572.)

Lag in Combustion.—An example, making use of Table IX, will show more clearly how the effect of lag in combustion is more marked at high revolution speeds. In a motor running at 300 r.p.m. each stroke is completed in $\frac{1}{10}$th second, if combustion is complete in $\frac{1}{200}$th second with ignition at dead centre, the crank pin will have passed through 9° or the movement of piston will have been through ·0061 volumes.

TABLE IX.

Angle α.	Angle β.	Volume Swept by Piston.	Volume Swept from 0° to β.	Piston Velocity at β if Average = 1,000.
0 —	9	·0061	·0061	216
9 —	18	·0183	·0244	614
18 —	27	·0300	·0545	816
27 —	36	·0410	·0955	926
36 —	45	·0508	·1464	1,114
45 —	54	·0596	·2061	1,274
54 —	63	·0669	·2730	1,407
63 —	72	·0725	·3455	1,498
72 —	81	·0763	·4218	1,556
81 —	90	·0782	·5000	1,575

If the motor is speeded up to 1,200 r.p.m. each stroke will occupy $\frac{1}{40}$th, second—if the richness of mixture is such that complete combustion still requires $\frac{1}{200}$ second with ignition at dead centre, then the crank pin will have moved through 36° or the piston will have moved through ·0955 volumes. If the weakening of mixtures either by dilution with air or residue exhaust, or attenuation by throttling, or a weaker igniting spark had resulted in $\frac{1}{100}$ second being required for complete combustion, then in the former case the piston would have moved through ·0244 volume whilst in the latter case the piston displacement would be no less than ·3455 volumes. If the mixture is sufficiently weak combustion will be so prolonged that it is not completed when the piston reaches the end of its stroke and so may result in ignition of the mixture in the induction pipe, when the inlet valve is opened.

The Spark Gap.—Slight inequalities in the spark gaps of the ignition plugs or in the electrical inductance of the plugs or the leads from the magneto to the various cylinders of a multi-cylinder engine and slight inequalities in mixture between one cylinder and another which would pass unnoticed at lower revolution speeds will be considerably magnified at high revolution speeds and the eradication of these differences will become the most serious part of the "tuning up" process, *i.e.*, supposing that the defect is not inherent in the design of the motor. Table VIII indicates that for a given mixture supply the time of combustion decreases almost in proportion to the increase in piston speed, so that if the other factors do not vary, a fixed point of ignition, as is now becoming common practice on automobiles, is justified where simplicity takes precedence to maximum efficiency. The table only goes up to a piston speed of 14·1 ft. per second, whereas speeds of 20 ft. per second are becoming common on aero engines. As shown on Table V, attenuation of the charge becomes a serious matter at high piston speeds, and if fixed ignition is used the mixture supplied must be much richer than at lower speeds in order to ensure complete combustion in a reasonable time, because the compression pressure will be less and the dilution with residue exhaust greater.

Spark Advance.—As shown by the experiment of Prof. Watson already mentioned, the mixture can be weakened if the spark is advanced and an increase of power obtained in spite of the back pressure due to combustion during the compression stroke. Forced feed as compared with ordinary suction feed would require less advance, because by limiting the adulteration with residue exhaust and ensuring a full cylinder charge, the compression pressure would be maintained, thus more rapid combustion would ensue.

A comparison of engines A and B, Table VI, will show that for a given position of ignition, B would require the richer mixture supply on account of lower compression and greater adulteration with residue exhaust, or for a given richness of mixture supply, B will require more advance of ignition than A.

Complete Combustion.—In the foregoing the term "complete combustion" has been somewhat loosely used for the sake of simplicity. Combustion actually takes place to a limited extent during the fall in pressure, due to dissociation.

Weight Per H.P.—Considering the question of weight per horse power from a purely mechanical standpoint, it is obvious that for a given power at a given speed the multi-cylinder engine will weigh less than the single-cylinder motor, because in the latter, all parts have to be made sufficiently strong to withstand the maximum pressure which occurs once in every two revolutions, whilst in the case of a four-cylinder motor the maximum pressures will only be of one quarter the intensity and will be applied to the crank-shaft four times in two revolutions.

Similarly an eight-cylinder motor would give eight impulses during two revolutions; each of only one eight the intensity of the maximum pressure of the single-cylinder motor, consequently the strength and weight of crank-shaft, crank-chamber &c., can be considerably reduced. The eight-cylinder motor could probably be run with no fly-wheel other than the propeller, whereas the single-cylinder motor would require a massive fly-wheel to carry it through the negative one and a-half revolutions with any degree of cyclic regularity. The same piston speed may be retained by decreasing the stroke and increasing the revolution speed, thus considerable saving in total weight of the motor will be obtained by the shortening of cylinders, connecting rods and the lesser diameter of the crank-chamber.

Crank-Chamber Weight.—The radial arrangement of cylinders will result in minimum weight of crank-chamber, because it will be no longer for the multi-cylinder motor than for the single-cylinder motor.

The mechanical limit to any engine's revolution speed is reached when the inertia of the reciprocating parts stresses the materials of which they are made up to the elastic limit. The wear and tear due to the inertia of the reciprocating parts is much greater on many aviation engines than the wear and tear due to the working pressure in the cylinders, which shows the great importance of keeping down the weight of moving parts.

Weight of Moving Parts.—For simplicity of explanation, suppose that an engine has its reciprocating parts replaced by others made of material four times the strength of the original material for the same weight. Assuming that the cross-sections may be reduced in proportion to the increase in strength of the new material, then the new parts will be only one quarter the weight of the old parts. The maximum speed at which the motor can be run varies with the inverse ratio of the square root of the weights of the parts, so that the motor can now be run at twice the speed at which it could with its original parts, with the same inertia stresses. The use of the higher grade material has enabled the motor to develop twice its original power, and the weight of the reciprocating parts has been reduced one quarter. Actually, difficulties of design due to slenderness of parts would modify this result.

Steel Forgings.—Considerable reduction in weight may be obtained by the entire use of machined high tensile steel forgings to replace all the parts commonly cast in iron or aluminium, but this is a question to be decided on the merits of individual cases—whether the saving in weight justifies the extra cost of production. For a given motor, weight may be decreased by allowing a smaller factor of safety in designing the various parts and by diminishing the wearing surfaces, but at the expense of reliability and durability.

Weight and Piston Speed.—It will be seen that high piston speed is the greatest factor in reducing weight and in limiting the heating of cylinder walls, so that some comparative limitations are set out below for a given piston speed and power.

(1) The loss of power will be less for a high compression ratio than for a low compression ratio, because there will be less residue exhaust to expand in order to reduce the pressure for the induction of the new charge and less adulteration with inert gas.

(2) A large bore cylinder will suffer less from attenuation than a small bore—because for practical reasons the valve diameter is proportional to the diameter.

(3) A long stroke engine will suffer less than a short stroke because a given time of combustion of the mixture will be a less percentage of the time of the stroke.

(4) The inertia stresses will be less in a short stroke motor than a long stroke, because given equally good design whilst the pistons will be of the same weight the weight of connecting rods will be proportional to the square of the stroke.

Forced Feed.—Forced feed of mixture by limiting the adulteration and heating of the charge and ensuring good compression would go far to wipe out the comparative limitations (1) (2) and (3), leaving inertia stresses as the most serious. (4) Favours short stroke and short stroke is favourable to weight reduction, but short stroke means high revolution speed, so that weight saved in the motor may be more than balanced by the extra complication and weight of the gear required to reduce the engine speed to proportions more suitable for the work of driving an aerial propeller.

The whole question of engine design is a compromise bearing in mind for each individual case the particular use to which the motor is to be put.

The Racer.—For the racing machine the problem is simply to make an engine which will last through one or two races with expert handling and develop maximum power during this period, after which it may be rebuilt or consigned to the scrap heap. The engine and accessories will probably represent about one third of the total weight of the machine and pilot. Weight cutting is of great importance, and durability need not exceed the period of the race.

For the two-seater touring machine the problem is to make an engine which will continuously develop say three quarters of its maximum power for an average of two hours per day for two hundred and fifty days in the year, with ordinary usage and attention. The engine and accessories will probably still represent about one third of the total weight of machine, passenger and pilot and an allowance of baggage. Weight cutting is still of importance, but the requirements of durability claim precedence.

The Future.—The future of the aeroplane lies in its success in cross-country work, where reliability and durability are of primary importance, pure speed taking second place. If by sacrificing reliability and durability an ocean liner could be built to make an average speed sufficiently high to reduce the time of crossing the Atlantic by twenty four hours and by dint of hard work by the engine room staff, the liner got through successfully nine times out of ten, but on the tenth broke down hopelessly in mid-ocean and had to wait for assistance in answer to its wireless calls and finish its crossing under tow; it is more than probable that intending passengers would book their passages by the slower and more reliable liners in preference to the record holder.

MORE HYDRO-AEROPLANING ROUND OUR COASTS.

SOME time back we mentioned that Mr. Frank Hucks, the elder brother of that excellent pilot, B. C. Hucks, was contemplating acquiring hydro-aeroplanes, and running exhibition flights at many of the more popular seaside resorts around our coast line. To this end he has formed a company, the Frank Hucks Waterplane Co., Ltd., and they have bought two Henry Farman hydro-biplanes with which to carry out their programme. These machines are of a later type than the one that appeared at Monaco, and they are both fitted with 70-h.p. Gnome engines. Owing to the labour troubles in France of late, delivery of these machines has been considerably delayed. However, at the time of writing, the first one is being shipped across the Channel, and will be taken to the Hamble River, Southampton Water, where it will be erected in a hangar, which has been built and kindly placed at the disposal of the company by the Hamble River, Luke, and Co., Ltd., a well-known local firm of yacht builders and engineers. The other machine is to follow on in a few days' time Fischer, the pilot that put up such excellent performances on the Henry Farman hydro-aeroplane at the Monaco meet, has been engaged to fly one of the machines. Mr. Frank Hucks is going to fly the other. Although a new comer to aviation, he has already succeeded in making quite a name for himself over at Etampes, where he has been practising for the past few weeks.

As we have already mentioned, the main idea of the firm is to specialise in water-flying. However, so that they may, should occasion arise, go inland to give an exhibition, each of their machines has been supplied with two landing chassis, floats for water-flying, and wheels and skids for land-flying. It is thus simply a matter of an hour's work to alter the machine from one type to the other. They are both of very large span, their upper planes measuring 54 feet from tip to tip, and have been tested to raise four passengers off the water with comparative ease. By the way, it is an identical machine that the British Government has acquired, and with which Commander Samson is now experimenting. As for the tour, here again the *Daily Mail* are supporting Mr. Hucks in his scheme, and particulars of the arrangements will immediately appear in that journal as soon as completed. This makes the fourth of the instructional aeroplane tours the *Daily Mail* have arranged.

Models

Conducted by V. E. JOHNSON, M.A.

Hydro-Aeroplanes.

THE principle of support in the case of both the hyroplane and the aeroplane are the same, the deflecting or sweeping downwards of a layer or stratum of water or air in order that they may derive the necessary support by the upward reaction to this downward force which is made use of to bring about an acceleration of some given mass of air or water. In the case of the hydro-aeroplane both these similar actions are brought into play. In the true hydro-aeroplane, as opposed to the aeroplane, supported on more or less boat-like floats, the common-sense conclusion appears to be to investigate by actual experiment how far the hydroplane and the aeroplane principle can be combined in the same member.

Before doing this, however, it is necessary to consider the question of floatation. What function has the floatation to perform. In the first case it must be sufficient to support the entire weight of the machine, model or otherwise, in the water. Actual practical experiment very quickly shows that this floatation must be ample; in other words it can, with advantage, be *at least* twice that stated above. In the second place the floats should offer the minimum of resistance to forward travel while in the water, and the minimum head resistance when in actual flight. In the third place they must be so constructed as to easily lift from the water, *i.e.*, the suction or water-skin effect must be a minimum, and in the fourth they must have a tendency to lift from the water at all speeds.

Referring to number one, as already stated, a very few experiments show that the floatation must be ample, and it must also have a wide base, otherwise if a side gust tends to tip the machine sideways, there will be a very considerable increase of weight on the dipping side, there being no solid support as in the case of land, the float will become submerged on that side and the machine will capsize and straightway become a submarine with the floats as conning towers. The same thing can be brought about in the case of a quick turn, or a wave travelling laterally can produce the same effect. The lateral breadth of floatage should certainly be not less than twice as great as the distance between the wheels supposing the machine intended to rise from the ground. The floatation must also be well ahead of the centre of gravity of the machine. The actual line of propeller thrust is considerably above the surface of the water, and unless the above plan be adopted the propeller thrust will not drive the machine along the surface of the water at all, but will drive the fore part or bow of the floats down into the water, with the result that the machine will capsize longitudinally and again become a submarine.

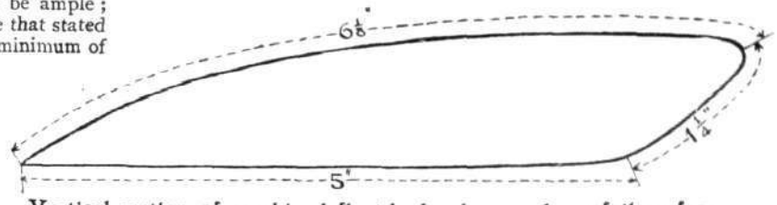
Passing on now to number three, we arrive at what is probably the crux of the whole question. Minimum resistance naturally suggests streamline form and long fore and aft dimensions, say cylindrical in shape, with a rounded head, and provided with a fish-like tail bent downwards at a small angle of incidence to provide the necessary hydroplanic action. In one model which we have seen the floats were cylindrical in shape with rounded head and flat stern, the entire cylinder being set at an angle of incidence. There were no hydroplanes proper. It is claimed that this model leaves the water. We are not in a position to contradict this, as we have not actually tried the experiment, but the method, even if successful, is clearly one of very inefficient and bad design.

Whatever the design of the floats they should be as light and as strong as possible, and considering for a moment the cylindrical type of float, the idea of a cylinder naturally suggests a tube of some sort, it must be light and watertight; this at once suggests rubber. If we take a piece of rubber tubing, 17 ins. long and $\frac{3}{16}$ in. in diameter, and inflate it by means of a foot cycle-pump, its diameter, when blown out, will be $1\frac{1}{4}$ ins., and the entire weight only 7 grammes. or one-fourth of an ounce. Its approx. vol. 16 cub. ins., allowing for rounded-off ends, *i.e.*, such a cylinder can displace 16 cub. ins. of water, or is capable of supporting a weight of rather more than 9 ozs. When thus blown out such a piece of tubing is extremely hard, and for its thickness strong.

It will be found that such a float can be held quite securely in wire rings *slightly* less than its diameter when inflated. Inflate it first and then place it in half-made wire ring made of twisted wire, then twist up the lower portion, and part of the same can be made to serve as a skid. Two such rings should be used for each float; the bottom of the rear ring need only be partly twisted, the remaining portion being opened up and covered with well-stretched oil silk, the whole being twisted upwards and backwards to serve as a hydroplane. The angle of incidence should be a small one.

Models can be and have been caused to rise from the surface of water by such means, but the method is, in our opinion, bad in every respect; it cannot be applied successfully to a commercial model, it is ridiculous as applied to any full-sized machine, and lastly it is altogether wrong in principle.

We have already stated that the floatation must be well ahead of the centre of gravity, if we then use a float long fore and aft, as the float emerges more and more from the water, the centre of floatation travels more and more to the rear, and the diving couple due to water resistance and propeller thrust can easily cause the machine to capsize forwards. In a tractor model which we have seen of this type the cylindrical floats stick out right forward of the propeller and are absolutely barred in consequence from being protected in any manner.



Vertical section of combined float-hydroplane and aerofoil surface.

A float of such a character serves the purpose of a float only, and when the machine is in actual flight, is but so much extra weight and head resistance, and the question which naturally arises is, is it not possible to combine the hydroplane and aeroplane principle (both of a similar character), and also the question of floatation all at the same time? To make the floatation surface of such a configuration that it shall not only support its own weight in the atmosphere, but do something more as well?

In other words—in the case of a biplane—to use the lower plane as both a float-hydroplane and aerofoil surface, the answer—so far at any rate as models are concerned—is in the affirmative. In the case of full-sized machines—the answer probably is to a more or less extent, it being in the main one of constructional considerations.

The plane to fulfil the triple function must be, of course, double-surfaced—the substance used absolutely waterproof. The illustration is a vertical section of such a plane which we have designed to fulfil such a function—and which we have recently tried on a model with complete success.

The breadth of the float of which the illustration is a dimensional sectioned sketch was 18 ins., its floatational capacity (tested in a bath) $2\frac{1}{2}$ lbs., *i.e.*, it just did *not* sink when carrying that weight. The weight of the float was $1\frac{1}{4}$ ozs., constructed of varnished silk stretched over a light wooden framework. It was divided into three compartments laterally. The silk and varnish used were both supplied us by Mr. G. P. Bragg-Smith. The model was a twin tractor, propellers centrale type, diam. 11·5 ins., total weight of model, inclusive of everything, 10 ozs.; weight of rubber $2\frac{1}{2}$ ozs., length of skeins 33·5 ins. The rubber was a year old, being, as a matter of fact, the identical rubber employed in last year's Wakefield competition; it was supplied us by Mr. T. W. K. Clarke. The number of turns given was about 350, and the rubber was lubricated with Bragg-Smith lubricant. The length of the model was 38 ins., the span of the main plane 33 ins. It may be best described, perhaps, as a highly-staggered biplane, with the float as the lower plane. An additional small float of a like character was also fitted at the rear.

The floats were set at a small angle of incidence. The floatage being so considerable—some 3 lbs. 2 ozs. in all—the model displaced only a very thin layer or stratum of water. On the propellers being wound up as stated, the model placed on the water, and the propellers released without any forward push of the model, the latter was found to rise from the surface—in quite calm air—with a run of slightly under 9 ft., *i.e.*, about three times its length; this it has done not only once but several times. When there was a breeze, and consequently waves, the distance was about the same.

All our earlier experiments were made with shapes of a more boat-like character, in which it was necessary to drive something *through* the water rather than on the top of it, and we were as much

surprised at the poorness of the results in this case as we were at the immediate success in the other. The model rising in the latter case quite easily at the first attempt.

The position of the main front float was such that its leading edge was just in the rear of the propellers.

We sincerely trust that the result of these experiments will do something to strike out a line of thought apart from the inflated rubber tube method—a flying stick on twin stilts with a string of sausages between them is something we can only think of with a suppressed shiver.

Other substances which suggest themselves for the making of floats are aluminium foil, very thin sheet celluloid, possibly copper foil, which can be obtained very thin. But the trouble with metal foils is that they are all so easily indented, and all at the finish are heavier than specially prepared silk. Very thin cork sheeting, or veneer wood on a wooden frame, are two more; but cork sheeting is no longer turned or cut out from the pure cork, but made of compressed cork and other things, and it is these latter that cause the trouble. And veneer wood is heavy compared to silk: and in—comparatively speaking—small models weight is a terrible bugbear.

That the section given in the illustration is the best we do not for a minute pretend. All we can say is that it has given most satisfactory results as a hydroplane—as an aeroplane surface it has obvious faults—possibly it might have a little more of the latter characteristics and a little less of the former, but one thing it must have, so far as our experiments go, *its bottom surface must be flat and it must have a large front angle of incidence*, i.e., *its leading edge must be practically its highest point.* [This does not mean that the bottomed surface may not be stepped.]

On no account must the nose of the float dip below the surface of water when skimming over it or the model will dive. We believe that there is a great future in this country for the hydro-aeroplane, which has at present not reached a state of development in which quite simple experiments made with models might not be of considerable value to designers of full-sized machines. There are many points still remaining to be dealt with, and we propose again recurring to the subject in next week's issue.

⊛ ⊛ ⊛ ⊛

THE KITE AND MODEL AEROPLANE ASSOCIATION.

OFFICIAL NOTICES.

British Model Records.

Hand-launched	Distance	G. Rowlands	429 yards.
	Duration	A. F. Houlberg	89 secs.
Off ground	Distance	H. R. Weston	26 yards.
	Duration	G. Rowlands	30 secs.

International Kite Meeting.—An international kite week will be held at Spa under the patronage of the L'Aero Club de Belgique, August 18th to 24th inclusive. Full details of the competitions and prizes will be published in next issue; any reader wishing to receive a programme can have one on application to hon. secretary.

Programmes of Competitions.—All modelists who have not received a copy of the Association's programme, 2nd edition, should at once apply for same enclosing stamp to cover postage.

Model Competition at 100-acre field, Greenford; station, Perivale Halt, G.W.R., *via* Westbourne Park, Saturday, July 6th, 3 o'clock. Steering competition for models rising off the ground. Free to members. Non-Members entrance fee 2*s*. Entries close June 29th. Prizes:—1st, silver cup; 2nd, silver medal; 3rd, bronze medal.

Tests.—(*a*) Straight flight ahead. (*b*) Circular flight to the right. (*c*) Circular flight to the left. Maximum marks, 150; 50 for each test.

Rules.—1. To qualify for test *a*, models must fly straight for not less than 50 yards. 2. To qualify for tests *b* and *c* models must make at least one complete circle. 3. Competitors may submit models of any kind. 4. Models must not weigh less than 6 ozs. 5. Competitors must be at the Judges' flag at 2.30 sharp. Those not present at that time will be disqualified. 6. Reasonable repairs will be allowed at the discretion of the judges. 7. Competitors will not be allowed to replace any part (or parts) without permission of the judges. 8. Models may be started by hand or in any other manner. 9. Each competitor is entitled to three trials if time permits.

W. H. AKEHURST, Hon. Sec.

27, Victory Road, Wimbledon.

⊛ ⊛ ⊛ ⊛

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

Model Clubs: Name of District only given. In brackets: Secretary's address.

Notes regarding Clubs must reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

Aero-Models Assoc. (N. Branch) (15, HIGHGATE AVENUE, N.).
EXCELLENT flying, Finchley, Saturday, and practice at Bowes Road. To-day, 29th, duration competition, Finchley, for Antimony rose bowl. Start 3 p.m.

Birmingham Aero Club (8, FREDERICK ROAD, EDGBASTON).
GOOD exhibitions at Moor Green, Saturday, by Messrs. Wilde, West, McManus, Trykle, Baker, Wood. Inter-club contest August Bank Holiday. At same time the Club Challenge Shield, the Midland Championship, and six silver medals will be competed for. Flying exhibition at Unionist demonstration at Great Barr, July 13th

Blackheath Aero Club (48, HAFTON ROAD, CATFORD, S.E.).
SATURDAY, at Grove Park, Mr. Dollittle tried new off-the-ground model. Mr. Whitworth experimented with self-rising machine. Messrs. Attwoll, Eland, Morgan, Waghorn, and Hunt also flying. Sunday, flying at Blackheath, Mr. A. B. Clark (Victor monoplanes), Mr. Hunt and Mr. Hinchcliffe (tractors). At Grove Park, Mr. Plummer (new single-stick model), Mr. A. Clark, of Catford (Ding-Sayers mono.), Mr. Trask (Bastra 10), Mr. Dollittle (0-1-1-2P). Remember K. and M.A.A. trials, July 13th. Programme of hon. sec.; also entry forms for all competitions by the Association. Flying Blackheath and Grove Park week-end as usual.

Croydon and District Aero Club (Sec., 158, HIGH STREET).
SATURDAY Mr. Roden got flight 593 yards, duration 65 secs. Others flying—Messrs. D. Pavely (Bristol tractor mono.), B. Smither (tractor mono.), best 90 yards, Dr. McMunn, Bell, Pearce, and C. and H. Smither. Rise-off-ground tractor competition first calm day for duration and stability. Flying prohibited on Mitcham Common. Meetings at Waddon until further notice. Flying every evening at Norbury or Purley.

Dover Model AeC. ("OAKVILLE," GODWYNE ROAD, DOVER).
REPRESENTATIVE teams from Dover, Folkestone, and Canterbury Model Aero Clubs had excellent competitions Saturday afternoon. Results:—Altitude, tie between C. Sargeant and H. D. Davis; speed, C. Sargeant (40 metres in 3 secs.); point-to-point, Black, of Folkestone, first. Messrs. Wells, Wakefield, and Wooster officiated as judges.

Ealing and District (1, QUEEN'S GARDENS, EALING, W.).
TO-DAY, Saturday, the K. and M.A.A. competition for models rising off the ground, at Greenford. July 3rd, general meeting, 8 p.m., at workshops of Twining Aeroplane Co. Agenda, election new secretary.

East Ham and District (54, SAVAGE GARDENS, EAST HAM).
FLYING as usual this week-end at New Beckton. Sec. will be pleased to hear from enthusiasts at East Ham, West Ham, Woolwich, and the district.

48th Glasgow Boy Scouts (285, RUTHERGLEN ROAD, GLASGOW).
FRIDAY evening display by model aero section before 113th (Burnside) Troop Boy Scouts, including hydro-aeroplane flying on Burnside Loch, by Messrs. Balden and Arthur, of S. Ae. S. Model Aero Club. In flying over the golf course, Leader J. Brown very successful (single screw with Etrich plane), as also Scoutmaster J. S. Gordon (high speed racers).

Hackney and District (THE HOLLIES, JENNER ROAD, N.).
SATURDAY, Bond obtained 40 secs. duration. General meeting July 5th, Spensley Hall, Brooke Road. Flying meetings on south end of Hackney Marshes.

Paddington and Districts (77, SWINDERLY ROAD, WEMBLEY).
SATURDAY, at Stonebridge Park, Mr. M. Levy did 45 secs., C. Wood 33⅗ secs. Carter, Woolley, Cannell, Jackson, Lane, Chalfont, and C. Levy also flying. Sunday, Mr. Woolley's single propeller machine flying well. W. Evans tuning up 3 ft. 6 in. model.

Reigate, Redhill and District (4, LONDON ROAD, REIGATE).
RESULT "Rawson" Cup Competition, decided Saturday:—Winner, H. V. May, 5 points (best attempts 338 yards, duration 55 secs.), and 107 yards from the given point; A. Lewis second, 285 yards, 45 secs., and 40 yards from point; W. H. Norton third, 219 yards, 38 secs., and 143 yards from point. Lewis one point behind, Norton 7 points. Afterwards Lewis obtained 506 yards straight measure. Exhibition flying and duration contest at "Monotype" Sports to-day (Saturday).

St. Mary's Model Club (32, BEECHAM ROAD, PORTSMOUTH).
AT Southsea Common Mr. H. W. A. Johnson broke club's distance record for single screws with flight 350 yards. C. Restall (twin-screw mono.) did over 200 yards. Others flying, H. Byerley, J. Haswell. Flying to-day, Saturday, Southsea Common, 2.30 p.m.

Scottish Ae.S. Model Aero Club (6, MCLELLAN STREET, GOVAN).
SATURDAY, at hydro-aero meeting, Whiteinch Pond, Mr. Arthur raised the club duration record to 21⅘ secs. nett time in air, landings on water very graceful. To-day (Saturday) distance and duration competition at Paisley Racecourse. Next Saturday, July competition at Paisley.

Sheffield Model Aero Club (35, PENRHYN ROAD, SHEFFIELD).
MEETING July 11th, Broomhead's Dining Rooms, Leopold Street, 7.30 p.m. Agenda, events, proposal *re* Colver Cup, presentation bronze medal for best added duration flights for month. Competition June 29th, Marsh Farm, High Lane, Ecclesall, 2.45.

South Norwood (240, HOLMESDALE ROAD).
GOOD flying during week. Hooker (new model), 30 secs. and 100 yards; Streeter (model parts from Weston, of Croydon), 50 secs. and 200 yards first flight; Daniels and Whenham also flying. Flying Mon., Wed., and Sat., Davidson Road, 6 o'clock.

Windsor Model Flying (10, ALMA ROAD, WINDSOR).
DURING week E. Stanbrook, S. Camm and F. Camm flying. S. Camm's rise-off model made successful appearance; weight 6½ ozs., driven by 1½ ozs. of rubber. Flying Home Park to-day, 2.30.

AIRSHIP NEWS.

A Long Cruise by "Parseval III."

ON Friday of last week the new German Army airship, "Parseval III," successfully cruised from Berlin to Koenigsberg, where one will be stationed in future, covering the 345 miles in a little under 11½ hours. At the start the airship had a sufficient supply of petrol on board to last twenty hours.

"Capitaine Ferber" Over the Frontier.

ON the 19th inst., the French military airship, "Capitaine Ferber," left Toul and made a long reconnoitring flight along the frontier, passing over Vaucouleurs.

"Victoria Louise" Visits Hamburg.

LEAVING Dusseldorf at 4.45 a.m. on the 18th inst., the Zeppelin liner "Victoria Louise," following the course taken by the "Zeppelin III," the other day passed Amsterdam at 7.45, Groningue 11.30, Welner 12.45, Oldenburg at 2.5, Bremen at 2.55, while Hamburg was reached at half-past five in the afternoon, after a voyage of over 700 kiloms. The airship carried nine passengers.

The German Navy Zeppelin.

IT appears that arrangements are now being made to commission the cruiser built by the Zeppelin Company for the German Naval Authorities in October next and that she will be stationed at Hamburg. The crew and officers are now being trained at Frankfort.

The "Charlotte" Back at Dusseldorf.

LEAVING her hangar at Wanne at 7.10 on the morning of the 20th inst., the Parseval dirigible "Charlotte," going by way of Essen and Duisburg, arrived at Dusseldorf at 8.40 and was safely docked shortly afterwards.

⊛ ⊛ ⊛ ⊛

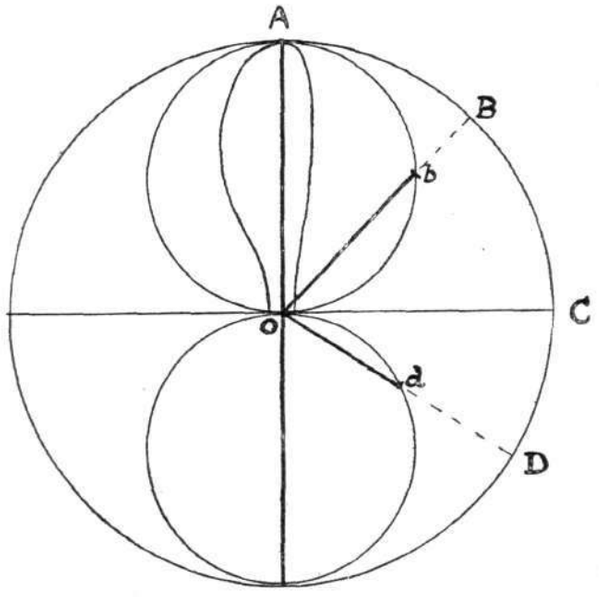
CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Gyroscopic Action.

[1584] On page 480 of FLIGHT for May 25th there is some data given on the gyroscopic torque due to a propeller of known dimensions and speed. This torque is given as $(292 \times v)$ lbs. ft., where v is called the "velocity of deviation" and is presumably the angular velocity (in radians per second) at which the direction of the axis of rotation is being turned in space. Taking this figure, it is easy to deduce the radius of gyration of the propeller, which appears to be 2·09 ft. For a two-bladed propeller of 4 ft. radius, this seems at first sight rather a small figure, as one would expect the radius of gyration to be at least 70 per cent. of the radius of the tip, viz., about 2·8 ft. However, taking the value of (292 × angular velocity of turn) to be correct for the maximum value of torque, it is



instructive to note that, for a two-bladed propeller this force is not uniform, but falls to zero twice per revolution. It is a maximum when the blades are in a line at right angles to the plane of the turning movement. It is zero when the line of the blades is in the plane of the turning movement.

For instance, let us suppose the aeroplane turns in a horizontal plane round a circle of 50 ft. radius when flying at 50 m.p.h. The maximum value of gyroscopic torque developed by the blades is 292 × 0·88 = 256 lbs. ft., where 0·88 is the angular velocity of turn in radians per sec. That is to say, a force of 128 lbs. is applied to each blade at 1 ft. radius, or 32 lbs. at the tip, tending to bend the blade. Now, at the instant the blades are in a vertical line, this force is a maximum. It decreases as the blades turn, and when they reach the horizontal position, the force is zero. It grows again to a maximum when the vertical is again reached. The law of the variation of this force with angle appears to be that of the sine of the angle and may be represented diagrammatically as shown.

OA, OB, OC, &c., represent successive positions of the propeller while rotating on its axis, and the circle A, B, C, D, &c., is that traced by the propeller tip. If we draw two small circles inside the large one as shown, we know that the part, such as Ob, cut off any radius, is proportional to the sine of the angle BOC from position OC, where the force is zero. Hence the lengths Ob, Od, &c., indicate the relative forces bending the blade at the various positions.

The net result is seen to be that gyroscopic action applies a vibratory force to the propeller—a force which passes through a complete cycle in one revolution of the blade. For the Curtiss propeller considered, the frequency of the force would be 20 per second, and of a greater or less magnitude, depending on the angular velocity of turning of the aeroplane. Now a propeller blade is an elastic body, and it also possesses mass, so that it has a fixed period of vibration of its own. One naturally asks—is its vibration period likely to be anywhere near that of the gyroscopic torque? I have no data or tests on propellers sufficient to enable me to answer this, but it is at least a possibility, and therefore leads to the further possibility of "resonance" and breakage. No doubt the damping force due to air friction is large, so that the amplitude of vibration might be kept within safe limits, but there appears to be a possibility of danger. At any rate, the matter is an interesting one for further investigation.

With further regard to the figure of $292 \times v$ given for the Curtiss propeller, perhaps this may be the *mean* value and not the maximum. If so, the maximum value would be about $460 \times v$, and would indicate a radius of gyration of 2·62 ft., which seems a more likely figure. The actual values, however, do not affect the argument given above.

R. C. CLINKER.

Tennyson on Flight.

[1585] In view of the progress made in the science of aviation, the lines below, from Lord Tennyson's poem, "Locksley Hall," are certainly prophetic, and feeling that they may prove of interest to readers of FLIGHT, I venture to send them on to you.

Walthamstow. V. H. MAIR.

"For I dipt into the future far as human eye could see,
Saw the vision of the world and all the wonder that would be;
Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales;
Heard the heavens fill with shouting, and there rain'd a ghastly dew,
From the nation's airy navies grappling in the central blue;
Far along the world-wide whisper of the south wind rushing warm,
With the standards of the people plunging through the thunder-[storm."

Strut Resistances.

[1586] I was extremely interested to see in FLIGHT (June 15th), the results of tests on struts made by Mr. Alec Ogilvie. It is extraordinary, to say the least of it, that a strut whose front and back edges are planes, perpendicular to the line of flight, should have less than half the resistance of a strut whose section is what is generally accepted as a streamline. I refer to Nos. 40 and 24. Perhaps Mr. Lanchester could explain?

I saw in a recent FLIGHT that Mr. Handley Page had obtained

the value ·8 for the coefficient of sweep, by calculations based on data obtained from M. Eiffel's experiments. I feel sure that if that gentleman were to make known how he obtained this important conclusion, more than one student of flight, besides myself, would be deeply grateful to him.

Gerrard's Cross. O. D. ATKINSON.

The Design of Aeroplanes.

[1587] It seems characteristic of the present stage of this branch of engineering that those engaged in it consistently ignore all the work previously done by others, particularly that which appears at first sight to be of a "theoretical" nature.

It is now seven years ago since F. W. Lanchester published his investigations on this subject, wherein he showed how, after a certain amount of experimental work all the structural data could be obtained for the construction of an aeroplane completely stable, and of maximum efficiency for given conditions, such as total weight, normal speed, &c. Yet scarcely an attempt has been made to secure even such an obvious condition as "rotational" stability.

Imagine a model of the Blériot type in flight, and having a tilt to the left. The model itself will now slide down an imaginary inclined plane to the left, whilst the vertical surface of the rudder, far out to the rear, will remain practically in the old line of flight. Thus the model will start a turn to the left, increasing the velocity of the right wing through the air, increasing its lift, and thus increasing the tilt to the left. This, of course, will ultimately produce the spiral dive which is the condition of "rotational" instability; and it is this spiral dive tendency, I believe, which in present-day machines the pilot, either by *ailerons* or wing-warping is continually correcting. The very real nature of this instability is readily proved by removing the front fin of a Lanchester aerodone (re-adjusting the weight, of course) when it will be found impossible to induce the model to glide more than a couple of feet without the spiral dive. These models are easily constructed with paper surfaces, and, after careful adjustment, show a truly marvellous degree stability in every respect, and have a very flat gliding angle for their size.

The only machines which, as ar as I know, have flown any appreciable distance, "hands off," are the Dunne and the Valkyrie, —the one having practically no vertical surface at all, and the other having its vertical surfaces distributed more or less evenly fore and aft of the c.g.—*i.e.*, the rudders and the "blinkers." Elastic-driven models have, in the main, no vertical surfaces.

The only kinds of stability at present considered appear to be directional and lateral, the latter being in any case quite masked by the lamentable lack of rotational stability. Longitudinal stability, though probably by no means *unsafe*, when supplemented by hand control, is needlessly reduced by a long boxlike tail of great moment of inertia.

The vertical fins, so much a feature of the Lanchester design, exert a great steadying influence on a model previously provided only with turned up wing-tips, causing it to appear as if the wing-tips ran on parallel guides. They would also absolutely prevent the "sideslip" to which the recent terrible accident at Brooklands is attributed.

From experiments with the above-mentioned models, I am convinced that a properly designed aeroplane of sufficiently high speed, say 70 m.p.h., should require no stabilising controls at all.

Cambridge. "'DONE."

Model Experiments.

[1588] I have lately been performing certain experiments, with a view to ascertaining whether Dr. Hankin's "Ergaer" theory had anything in its favour. At the end of my investigations I had collected a lot of data and had a few surprises, but as I do not possess a very good capacity for mathematical deduction I am forwarding same in hopes that if it is published some acute reader will deduce some analogy between them.

I used a large Allport-type monoplane and a biplane glider in my investigations. On the under side of the wing tips could be fastened a thin metal disc, insulated from the plane by indiarubber. The models were fitted with chassis to prevent the discs from coming into contact with the ground. The following are my notes:—

Flew mono. Slight tendency to drop tail.

Charged discs positively, and flew again. Decreased lift of main plane.

Charged discs negatively. Head rose, and model eventually fell on tail.

(Very few turns were given to the pr., so as not to interfere with outside forces).

Charged discs oppositely. Model greatly oscillated in vertical plane, and finally *dropped without gliding.*

From 8 ft. high. (Tested glider (Avro). Approximate gliding angle 1 in 6.

Charged post. Angle about 1 in 3 and a nose-dive.

Charged neg. Fine soaring glide of about 70 ft.

Charged opp. Turned over and made a bad spiral glide.

I used a Wimshurst machine giving a 2-in. spark to charge the discs, and a dry-pile electroscope to identify the nature of the charges. The discs generally retained their original charge after landing, except when charged oppositely, when they were *neutralised.*

Not possessing an electrometer I was unable to measure the actual potential of the discs or the potential of the air.

Hoping you will find this of sufficient general interest to publish.

Hove. HARRY R. KERRUISH.

⊛ ⊛ ⊛ ⊛

A Collision in Mid-Air.

THE fearful accident at La Brayelle aerodrome, near Douai, on the 19th inst. once more, as we point out elsewhere, emphasises the necessity of the enforcement of regulations governing the passing of aeroplanes. It appears that although the morning was very misty some half-a-dozen officers had made flights just previously to the catastrophe. The two officers, Capt. Dubois and Lieut. Peignan, were flying in the opposite direction to usual practice, and both started a turn at the same time. Realising that something must be done to avoid a collision, each officer commenced to elevate, intending to pass over the other. The simultaneous action, however, defeated the object, and the biplanes met about 200 ft. above the ground. Both machines dropped to the ground a mass of wreckage, and Lieut. Peignan was killed on the spot, while Capt. Dubois passed away about an hour later.

⊛ ⊛ ⊛ ⊛

NEW COMPANY REGISTERED.

Frank Hucks Waterplane Co., Ltd., 2, Adelaide Road, Hampstead, N.W.—Capital £5,000, in £1 shares.

⊛ ⊛ ⊛ ⊛

Aeronautical Patents Published.

Applied for in 1911.

Published June 27th, 1912.

15,207. L. C. BRÉGUET. Wings of aeroplanes.
17,602. R. F. RICHARDS. Steering of aeroplanes.
20,866. G. M. FORREST. Aerial machine.
29,364. L. A. HAVOT. Supporting aeroplanes.

Applied for in 1912.

Published June 20th, 1912.

22,402. C. NAVARO. Aeroplanes.
28,638. L. BLERIOT. Aeroplanes.

Published June 27th, 1912.

265. P. DORHOFER. Springs for running wheels of aeroplanes.
1,730. M. BANTI. Aeroplane which is not capable of upsetting.
2,345. O. TROSSIN AND A. MICHAELIS. Flying machine.
3,972. W. C. PIGGOTT AND PIGGOTT BROS. AND CO. Tents for aeroplanes.

PRINCIPAL CONTENTS.

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.

Telegraphic address: Truditur, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT *will be forwarded, post free to any part of the world at the following rates:—*

UNITED KINGDOM.	s.	d.	ABROAD.	s.	d.
3 Months, Post Free ...	1	8	3 Months, Post Free ...	2	9
6 ,, ,, ...	3	3	6 ,, ,, ...	5	6
12 ,, ,, ...	6	6	12 ,, ,, ...	11	0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., *and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.*